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Tapeworms (Platyhelminthes, Cestoda) from marine chondrichthyans of the Southwestern Atlantic Ocean, and the sub-Antarctic and Antarctic islands: a checklist

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Abstract

A parasite-host list of cestodes parasitizing chondrichthyans in the Southwest Atlantic off Argentina and surrounding waters of Antarctica is compiled based on the available literature. The list is based on published descriptions and redescriptions of species, and newly collected worms during the current study. A total of 57 valid species belonging to 28 genera of the orders Cathetocephalidea, Diphyllidea, Gyrocotylidea, Lecanicephalidea, Onchoproteocephalidea, Phyllobothriidea, Rhinebothriidea, "Tetraphyllidea", and Trypanorhyncha is listed. Information on hosts, localities, specimens in collections and comments on tapeworms are also included. A host-parasite list including chimaeras (1 order, 1 genus), batoids (4 orders, 10 genera), and sharks (3 orders, 5 genera) is provided. Tapeworm diversity, distribution range, and host associations are discussed. The cestodes orders Phyllobothriidea and Rhinebothriidea exhibit the highest species richness, with 13 and 12 species, respectively. Onchoproteocephalideans and rhinebothriideans have the broadest geographic distribution in the study area. Regarding hosts, arhynchobatid skates are the group most frequently associated with cestodes. However, further collecting efforts are necessary to understand whether this data reflect the real diversity and host association of these parasites or is a result of a bias in sampling.

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Keywords
Batoids, biodiversity, parasites, sharks, tapeworms, taxonomy

Introduction

According to Froese and Pauly (2022), more than 500 species of fishes have been registered along the Southwestern Atlantic off Argentina and the sub-Antarctic and Antarctic islands (including South Georgia, Elephant, and Joinville islands), including 100 chondrichthyan species (Table 1) (Gabbanelli et al. 2018; Concha et al. 2019; Froese and Pauly 2022). Since these cartilaginous fishes are the definitive hosts of a great diversity of adult cestodes (Caira and Jensen 2014), it is not uncommon to find a large variety of taxa of tapeworms along the Southwestern Atlantic and the Southern seas.

Complete and accurate species lists are essential for many biological disciplines such as ecology, conservation, and biogeography. Particularly, comprehensive fish cestodes datasets are necessary if we consider the usefulness of these parasites as biological tags for stock identification of their elasmobranch hosts in the context of overfishing and habitat degradation have profoundly altered the populations of marine elasmobranch (Dulvy et al. 2014; Irigoitia et al. 2017; Irigoitia et al. 2022). To date, cestodes from the Southwestern Atlantic, sub-Antarctic, and Antarctic regions were listed only in a few articles. These included a list of fishes and their tapeworms from South America (Alves et al. 2017), a compilation of marine invertebrates from the Argentine Sea focusing on taxonomic information at the generic level only (Bigatti and Signorelli 2018), and a few works about cestodes of Antarctic fishes (Rocka and Zdzitowiecki 1998; Rocka 2003, 2017). The analysis of the endoparasites in Antarctic fishes showed significantly higher values of diversity indices compared to the sub-Antarctic ichthyofauna (Muñoz and Cartes 2020); it would be interesting to consider the diversity of cestodes in a wider context, especially including the Southwestern Atlantic and southern latitudes off Antarctica in a single study. However, no complete work about cestodes from chondrichthyans, with detailed distributional ranges and host associations in this particular area of the Southern Hemisphere has been compiled so far.

In order to facilitate further studies, the main goal of this work is to elaborate a complete checklist of cestodes in chondrichthyan hosts based on summarizing references. The study area includes the Southwestern Atlantic Ocean off Argentina, Río de la Plata estuary, and the surrounding waters of South Georgia and the Elephant and Joinville islands by surrounding waters of South Georgia, Elephant and Joinville islands. This list includes information on localities, specimens in collections, and comments about the parasites and their hosts reported in previous works. We have also incorporated information about cestodes described in the last years, which included numerous new records and new localities (Menoret et al. 2017; Franzese and Ivanov 2018, 2020a, b, 2021; Menoret and Ivanov 2021; Franzese et al. 2022; this study).

Table 1. Chondrichthyans reported from the Southwestern Atlantic Ocean off Argentina, Río de la Plata estuary, and the sub-Antarctic and Antarctic islands (including South Georgia, Elephant, and Joinville islands).

Subclass	Order	Family	Genera	Species	Sampled chondrichthyan species
Holocephalii	Chimaeriformes	Callorhinchidae	1	1	1
		Chimaeridae	1	1	0
Subtotals	**1**	**2**	**2**	**2**	**1**
Batoidea	Myliobatiformes	Dasyatidae	2	3	0
		Mobulidae	1	1	0
		Myliobatidae	1	3	2
	Rajiformes	Arhynchobatidae	5	31	19
		Rajidae	2	8	3
	Rhinopristiformes	Pristidae	1	1	0
		Rhinobatidae	1	1	0
		Trygonorrhinidae	1	1	1
	Torpediniformes	Narcinidae	2	3	1
		Torpedinidae	1	1	0
Subtotals	**4**	**10**	**17**	**53**	**26**
Selachii	Carcharhiniformes	Carcharhinidae	2	7	1
		Galeocerdonidae	1	1	0
		Scyliorhinidae	2	2	0
		Sphyrnidae	1	3	0
		Triakidae	2	4	3
	Echinorhiniformes	Echinorhinidae	1	1	0
	Hexanchiformes	Hexanchidae	3	3	1
	Lamniformes	Alopiidae	1	1	0
		Carchariidae	1	1	0
		Cetorhinidae	1	1	0
		Lamnidae	3	3	0
	Squaliformes	Dalatiidae	2	2	0
		Etmopteridae	2	6	0
		Somniosidae	3	4	0
		Squalidae	1	3	0
	Squatiniformes	Squatinidae	1	3	1
Subtotals	**6**	**16**	**27**	**45**	6
Totals	**11**	**28**	**46**	**100**	**33**

Materials and methods

After an exhaustive bibliographical search, an annotated and revised parasite-host checklist was generated for the adult cestodes from marine chondrichthyans reported between 35°S–63°S. The geographical area considered covers the Southwestern Atlantic Ocean off Argentina (from 35°S southward), Río de la Plata estuary, and surrounding waters off South Georgia, Elephant, and Joinville islands. The cestode species are arranged according to taxonomic categories and are presented alphabetically, followed by data on their hosts, including valid species name, order, family, and synonymous species name used in literature (if available) in parentheses. The information for localities includes location, coordinates in degrees and minutes (if available in the literature), province, and country (where applicable) only for the type locality. The type-host and the type locality refer to data included in the original descriptions of cestodes species.

Other hosts and other localities only refer to the records within the study area, including those in the original descriptions as well as those mentioned in redescriptions, other papers and newly collected materials sampled during the present study. Specimens in collections include type material from original descriptions, voucher specimens from redescriptions and new voucher specimens prepared during the present study. Information about the new voucher specimens is in bold.

For the preparation of the figures, estimated coordinates were assigned to those records that lacked such information in the original publication.

Based on the information from the parasite-host checklist, the host-parasite data were subdivided into two inventories, one for batoids and chimaeras and another for sharks. The host species are arranged according to taxonomic categories and presented alphabetically, followed by the data on their parasites.

New vouchers of cestodes were obtained from the spiral intestines of chondrichthyans that had been caught by commercial trawlers between 2009 and 2017. The spiral intestines were fixed in 10% formalin and transferred to 70% ethanol for storage in the Laboratorio de Sistemática y Biología de Parásitos de Organismos Acuáticos (SIBIPOA) of Instituto de Biodiversidad y Biología Experimental y Aplicada (IBBEA, CONICET-UBA). Cestodes were hydrated in a graded ethanol series, stained with Harris' hematoxylin, dehydrated in a graded ethanol series, cleared in methyl salicylate, and mounted in Canada balsam (Menoret and Ivanov 2021; Franzese et al. 2022).

The accession numbers of the available molecular sequences were taken from the GenBank database, considering only those specimens whose identification is not doubtful.

The classification and valid cestodes names follow Caira and Jensen (2017) and Caira et al. (2022). The classification and valid host names follow Menni and Lucifora (2007), Naylor et al. (2012), Weigmann (2016), Gabbanelli et al. (2018), Concha et al. (2019), Stehmann et al. (2021), and Froese and Pauly (2022). Abbreviations of the collection names used are listed in Table 2.

Table 2. Museum abbreviations.

AHC	Australian Helminthological Collection, South Australian Museum, Adelaide, Australia
CHIOC	Coleção Helmintológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brazil
BMNH/NHMUK	Natural History Museum, London, United Kingdom
HWML	Harold W. Manter Laboratory of Parasitology, University of Nebraska State Museum, Nebraska, United States of America
IPCAS	Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice, Czech Republic
LRP	Lawrence R. Penner Parasitology Collection, Department of Ecology and Evolutionary Biology, University of Connecticut, Connecticut, United Stated of America
MACN-Pa	Museo Argentino de Ciencias Naturales, Colección Parasitológica, Buenos Aires, Argentina
MLP	Colección de Invertebrados, Museo de La Plata, La Plata, Argentina
MNHNC	Museo Nacional de Historia Natural de Chile, Santiago, Chile
MNHNF	Muséum National d'Histoire Naturelle, Paris, France
MZPW	Museum and Institute of Zoology, Polish Academy of Science, Warsaw, Poland
NMW	Naturhistorisches Museum Wien, Vienna, Austria
USNM	National Museum of Natural History of the Smithsonian Institution, Washington, United States of America
USNPC	U. S. National Parasite Collection, Maryland, United States of America, currently incorporated in the UNNM

Results

Parasite-host checklist

Order Cathetocephalidea Schmidt & Beveridge, 1990
Family Cathetocephalidae Dailey & Overstreet, 1973
Genus *Cathetocephalus* Dailey & Overstreet, 1973

***Cathetocephalus australis* Schmidt & Beveridge, 1990**

Type host. *Carcharhinus brachyurus* (Günther) (Carcharhiniformes: Carcharhinidae).
Type locality. Goolwa, South Australia.
Other locality. Off Argentina.
Specimens in collections. AHC No. V4123 (holotype); AHC Nos. 17535, 17536 (paratypes).
References. Schmidt and Beveridge (1990), Suriano and Labriola (2001a).

Order Diphyllidea Carus, 1863
Family Echinobothriidae Perrier, 1897
Genus *Coronocestus* Caira, Marques, Jensen, Kutcha & Ivanov, 2013

***Coronocestus notoguidoi* (Ivanov, 1997)**

Echinobothrium notoguidoi Ivanov, 1997. Syn.

Type host. *Mustelus schmitti* Springer (Carcharhiniformes: Triakidae).
Type locality. Mar del Plata (38°00'S, 57°33'W), Buenos Aires Province, Argentina.
Specimens in collections. MLP No. 3893C (holotype); MLP Nos. 3894C (paratypes); USNPC No. 87169 (paratypes).
GenBank Acc. No. DQ088034.
References. Ivanov (1997), Alarcos et al. (2006), Tyler (2006), Caira et al. (2013b).
Comments. Tyler (2006) modified the original description of Ivanov (1997) and added new morphological information based on type material.

Genus *Echinobothrium* Van Beneden, 1849

***Echinobothrium acanthocolle* Wojciechowska, 1991**

Type host. *Amblyraja georgiana* (Norman) (Rajiformes: Rajidae) (*Raja georgiana*).
Type locality. Shelf near South Georgia, South Atlantic Ocean.
Specimens in collections. No specimens were deposited in a public collection.
References. Wojciechowska (1991a), Rocka (2003).
Comments. Holotype and paratype are in Wojciechowska's personal collection.

Genus *Halysioncum* Caira, Marques, Jensen, Kutcha & Ivanov, 2013

Halysioncum megacanthum (Ivanov & Campbell, 1998)

Echinobothrium megacanthum Ivanov & Campbell, 1998. Syn.

Type host. *Myliobatis goodei* Garman (Myliobatiformes: Myliobatidae).

Type locality. San Antonio Oeste, San Matías Gulf (40°44'S, 64°56'W), Río Negro Province, Argentina.

Specimens in collections. MLP No. 3958 (holotype); IPCAS No. C-288 (paratypes); USNM No. 1382674 (paratypes).

References. Ivanov and Campbell (1998a), Tyler (2006), Caira et al. (2013b).

Comments. Tyler (2006) modified the original description of Ivanov and Campbell (1998a) and added new morphological information based on type material.

Halysioncum pigmentatum (Ostrowski de Núñez, 1971)

Echinobothrium pigmentatum Ostrowski de Núñez, 1971. Syn.

Type host. *Zapteryx brevirostris* (Müller & Henle) (Rhinopristiformes: Trygonorrhinidae).

Type locality. Mar del Plata, Buenos Aires Province, Argentina.

Specimens in collections. No specimens were deposited in a public collection.

References. Ostrowski de Núñez (1971), Tyler (2006), Caira et al. (2013b).

Comments. Holotype and paratypes remain in Ostrowski de Núñez's personal collection. Tyler (2006) modified the original description of Ostrowski de Núñez (1971) and added new morphological information based on material from the author's personal collection.

Order Gyrocotylidea Poche, 1926
Genus *Gyrocotyle* Diesing, 1850

Gyrocotyle maxima Mac Donagh, 1927

Type host. Probably *Callorhinchus callorynchus* (Linnaeus) (Chimaeriformes: Callorhinchidae) (*Mustelus asterias*).

Type locality. Probably off Mar del Plata, Buenos Aires Province, Argentina.

Specimens in collections. Instituto Bacteriológico, Buenos Aires.

Reference. Mac Donagh (1927).

Gyrocotyle rugosa Diesing, 1850

Type host. *Callorhinchus callorynchus* (Chimaeriformes: Callorhinchidae).

Type locality. Portum Natalensem, South Africa.
Other locality. Necochea, Buenos Aires Province.
Specimen in collections. NMW No. 2502 (neotype).
GenBank Acc. Nos. MW587267, MW587258, MW581656.
References. Mac Donagh (1927), Barčák et al. (2021).
Comments. *Gyrocotyle rugosa* has a wide distribution including coastal waters of South America, South Africa, and New Zealand.

Order Lecanicephalidea Hyman, 1951
Family Aberrapecidae Jensen, Caira, Cielocha, Littlewood & Waeschenbach, 2016
Genus *Aberrapex* Jensen, 2001

***Aberrapex arrhynchum* (Brooks, Mayes & Thorson, 1981)**

Discobothrium arrhynchum Brooks, Mayes & Thorson, 1981. Syn.

Type host. *Myliobatis goodei* (Myliobatiformes: Myliobatidae).
Type locality. Río de la Plata estuary near Montevideo, Uruguay.
Specimens in collections. USNPC No. 75722 (holotype); USNPC No. 75723 (paratype); HWML No. 21003 (paratypes).
References. Brooks et al. (1981), Jensen (2001).

***Aberrapex ludmilae* Menoret, Mutti & Ivanov, 2017**

Type host. *Myliobatis goodei* (Myliobatiformes: Myliobatidae).
Type locality. San Matias Gulf (40°58'S, 64°56'W), Río Negro Province, Argentina.
Specimens in collections. MACN-Pa No 616-1 (holotype); MACN-Pa Nos. 616/2–5 (paratypes); IPCAS No. C-755/1–2 (paratypes); LRP No. 9239 (paratypes).
Reference. Menoret et al. (2017).

***Aberrapex sanmartini* Menoret, Mutti & Ivanov, 2017**

Type host. *Myliobatis goodei* (Myliobatiformes: Myliobatidae).
Type locality. Off Carmen de Patagones (40°42'S, 62°00'W), Buenos Aires Province, Argentina.
Specimens in collections. MACN-Pa No. 617/1 (holotype); MACN-Pa Nos. 617/2–12 (paratypes); IPCAS Nos. C-756/1–2 (paratypes); LRP Nos. 9242, 9243 (paratypes).
Reference. Menoret et al. (2017).

Aberrapex vitalemuttiorum Menoret, Mutti & Ivanov, 2017

Type host. *Myliobatis ridens* Ruocco, Lucifora, Díaz de Astarloa, Mabragaña & Delpiani (Myliobatiformes: Myliobatidae).

Type locality. Off Villa Gesell (37°29'S, 56°45'W), Buenos Aires Province, Argentina.

Other locality. Punta Negra, Necochea (38°37'S, 58°51'W), Buenos Aires Province.

Specimens in collections. MACN-Pa No 618/1 (holotype); MACN-Pa Nos. 618/2–10 (paratypes); IPCAS Nos. C-757/1–2 (paratypes); LRP Nos. 9240, 9241 (paratypes).

Reference. Menoret et al. (2017).

Family Paraberrapecidae Jensen, Caira, Cielocha, Littlewood & Waeschenbach, 2016
Genus *Paraberrapex* Jensen, 2001

Paraberrapex atlanticus Mutti & Ivanov, 2016

Type host. *Squatina guggenheim* Marini (Squatiniformes: Squatinidae).

Type locality. Off Puerto Quequén (38°53'S, 58°27'W), Buenos Aires Province, Argentina.

Other localities. Near Río de la Plata estuary (36°21'S, 54°32'W), off Villa Gesell (37°17'S, 56°27'W), off Carmen de Patagones (40°58'S, 62°00'W), Buenos Aires Province. San Matías Gulf (41°03'S, 64°06'W), Río Negro Province.

Specimens in collections. MACN-Pa No 618/1 (holotype); MACN-Pa Nos. 618/2–10 (paratypes); IPCAS Nos. C-757/1–2 (paratypes); LRP Nos. 9240, 9241 (paratypes).

Reference. Mutti and Ivanov (2016).

Order Onchoproteocephalidea Caira, Jensen, Waeschenbach, Olson & Littlewood, 2014
Family Onchobothriidae Braun, 1900
Genus *Acanthobothrium* Blanchard, 1848

Acanthobothrium carolinae Franzese & Ivanov, 2020

Type host. *Bathyraja magellanica* (Philippi) (Rajiformes: Arhynchobatidae).

Type locality. Coastal waters off Puerto San Julián (49°29'S, 66°11'W), Santa Cruz Province, Argentina.

Other localities. Coastal waters off Río Grande (54°01'S, 67°06'W), Tierra del Fuego Province. Namuncurá Marine Protected Area/Burdwood Bank (54°32'S, 60°01'W).

Specimens in collections. MACN-Pa No. 716 (holotype); MACN-Pa Nos. 717/1–4, 718/1–3, 719/1–2 (paratypes); IPCAS No. C-838 (paratypes); LRP Nos. 10179–10184 (paratypes).

Reference. Franzese and Ivanov (2020a).

Table 3. Cestodes and their respective hosts collected for this study.

Taxon	Host	Capture coordinates	New locality
Onchoproteocephalidea			
Onchobothriidae			
Acanthobothrium			
A. domingae	*Dipturus brevicaudatus*	38°00'S, 56°04'W	Mar del Plata, Buenos Aires
A. marplatensis	*Atlantoraja castelnaui*	38°46'S, 57°56'W	Puerto Quequén, Buenos Aires
A. stefaniae	*Discopyge tschudii*	38°46'S, 57°56'W	Puerto Quequén, Buenos Aires
Rhinebothriidea			
Echeneibothriidae			
Echeneibothrium			
E. williamsi	*Dipturus brevicaudatus*	38°46'S, 57°56'W	Puerto Quequén, Buenos Aires
Notomegarhynchus			
N. navonae	*Atlantoraja castelnaui*	38°46'S, 57°56'W	Puerto Quequén, Buenos Aires

Acanthobothrium domingae Franzese & Ivanov, 2020

Type host. *Dipturus brevicaudatus* (Marini) (Rajiformes: Rajidae).

Type locality. Coastal waters off Santa Teresita (36°35'S, 54°54'W), Buenos Aires Province, Argentina.

Other localities. Coastal waters off Río Grande (53°35'S, 66°37'W), Tierra del Fuego Province. **Coastal waters off Mar del Plata (38°00'S, 56°04'W), Buenos Aires Province** (Table 3).

Specimens in collections. MACN-Pa No. 720 (holotype); MACN-Pa Nos. 721/1–3, 722/1–9, 723(paratypes); IPCAS No. C-839 (paratypes); LRP Nos. 10185–10195 (paratypes); **MACN-Pa No. 770 (voucher)**.

Reference. Franzese and Ivanov (2020a).

Acanthobothrium marplatensis Ivanov & Campbell, 1998

Type host. *Atlantoraja castelnaui* (Miranda Ribeiro) (Rajiformes: Arhynchobatidae) (*Rioraja castelnaui*).

Type locality. Mar del Plata (38°00'S, 57°33'W), Buenos Aires Province, Argentina.

Other locality. Puerto Quequén (38°46'S, 57°56'W), Buenos Aires Province (Table 3).

Specimens in collections. MLP No. 4025 (holotype); MLP No 4026 (paratype); USNM No. 1382675 (paratypes); BMNH No 1998.2.10.1–2 (paratypes); **MACN-Pa No. 771 (voucher)**.

Reference. Ivanov and Campbell (1998b).

Acanthobothrium stefaniae Franzese & Ivanov, 2018

Type host. *Discopyge tschudii* Heckel (Torpediniformes: Narcinidae).

Type locality. Coastal waters off Mar Chiquita City (37°46'S, 56°56'W), Buenos Aires Province, Argentina.

Other localities. Coastal waters off Villa Gesell (37°29'S, 56°45'W), off San Clemente del Tuyú (35°50'S, 56°18'W), **off Puerto Quequén (38°46'S, 57°56'W)** (Table 3), Buenos Aires Province. Coastal waters off Camarones (45°08'S, 65°19'W), Chubut Province.

Specimens in collections. MACN-Pa No 624 (holotype); MACN-Pa Nos. 625/1–6, 626/1–3, 627/1, 628/1–2 (paratypes); IPCAS No. C-786 (paratypes); LRP Nos. 9403–9410 (paratypes); **MACN-Pa No. 772 (voucher)**.

Reference. Franzese and Ivanov (2018).

Acanthobothrium zapterycum Ostrowski de Núñez, 1971

Type host. *Zapteryx brevirostris* (Rhinopristiformes: Trygonorrhinidae).

Type locality. Mar del Plata, Buenos Aires Province, Argentina.

Other localities. Coastal waters off Villa Gessel (37°29'S, 56°45'W), La Lucila del Mar (36°38'S, 56°15'W), Puerto Quequén (38°46'S, 57°56'W), Buenos Aires Province. Puerto Pirámides (42°05'S, 62°50'W), Chubut Province.

Specimens in collections. MACN-Pa No. 214/1(holotype); MACN-Pa No. 214/1–5 (paratypes); MACN-Pa Nos. 629/1, 630/1–3, 631/1–4, 632/1–4 (vouchers); IPCAS No. C-787 (vouchers); LRP Nos. 9411–9417 (vouchers).

Reference. Ostrowski de Núñez (1971), Franzese and Ivanov (2018).

Acanthobothrium sp.

Hosts. *Bathyraja cousseauae* Díaz de Astarloa & Mabragaña, *Bathyraja magellanica* (Rajiformes: Arhynchobatidae); *Myliobatis goodei* (Myliobatiformes: Myliobatidae); *Zapteryx brevirostris* (Rhinopristiformes: Trygonorrhinidae).

Localities. Río de La Plata estuary, Uruguay; Mar del Plata, Buenos Aires Province, Argentina; Malvinas Islands, Southwestern Atlantic Ocean.

Specimens in collections. HWML Nos. 20999, 21000.

References. Ostrowski de Núñez (1971), Brooks et al. (1981), Beer et al. (2019).

Comments. Ostrowski de Núñez (1971) registered *Acanthobothrium* sp. from *Z. brevirostris* in Mar del Plata. Brooks et al. (1981) reported two specimens of *Acanthobothrium* sp. from *M. goodei* at Río de la Plata, which could be a different species. They pointed out that one of these specimens could correspond to the same species reported by Ostrowski de Núñez (1971) in *Z. brevirostris*. Beer et al. (2019) reported *Acanthobothrium* sp. from *B. cousseauae* and *B. magellanica* off Malvinas Islands. The deposited material only corresponds to the specimens studied by Brooks et al. (1981).

Genus *Onchobothrium* de Blainville, 1828

Onchobothrium antarcticum Wojciechowska, 1990

Type host. *Bathyraja eatonii* (Günther) (Rajiformes: Arhynchobatidae).

Type locality. shelf around Joinville Island in Bransfield's Strait, Antarctica.

Specimens in collections. MZPW No. 1805 (holotype); MZPW No. 1806 (paratype); BMNH 1989.4.19.1 (paratype).

References. Wojciechowska (1990a), Rocka (2003, 2017).

Order Phyllobothriidea Caira, Jensen, Waeschenbach, Olson & Littlewood, 2014
Family Phyllobothriidae Braun, 1900
Genus *Crossobothrium* Linton, 1889

Crossobothrium antonioi Ivanov, 2009

Type host. *Notorynchus cepedianus* (Péron) (Hexanchiformes: Hexanchidae).

Type locality. Puerto Quequén (38°32'S, 58°42'W), Buenos Aires Province, Argentina.

Specimens in collections. MACN-Pa No. 493/1 (holotype); MACN-Pa Nos. 493/2–6 (paratypes).

Reference. Ivanov (2009).

Crossobothrium pequeae Ivanov, 2009

Type host. *Notorynchus cepedianus* (Hexanchiformes: Hexanchidae).

Type locality. Puerto Quequén (38°32'S, 58°42'W), Buenos Aires Province, Argentina.

Specimens in collections. MACN-Pa No. 494/1 (holotype); MACN-Pa Nos. 494/2–6 (paratypes).

Reference. Ivanov (2009).

Genus *Guidus* Ivanov, 2006

Guidus antarcticus (Wojciechowska, 1991)

Marsupiotbothrium antarcticum Wojciechowska, 1991. Syn.

Type host. *Bathyraja maccaini* Springer (Rajiformes: Arhynchobatidae).

Other host. *Bathyraja eatonii* (Rajiformes: Arhynchobatidae).

Type locality. Shelf around Joinville Island, Antarctica.

Specimens in collections. MZPW No. 1817 (holotype); BMNH No. 1992.1.6.31 (paratype).

References. Wojciechowska (1991a), Rocka (2003), Ivanov (2006).

Guidus argentinense Ivanov, 2006

Type host. *Bathyraja brachyurops* (Fowler) (Rajiformes: Arhynchobatidae).

Type locality. Coastal waters off Buenos Aires Province (37°06'S, 54°20'W), Argentina.

Other localities. Off Bahía Blanca (39°34'S, 56°16'W), Buenos Aires Province. Namuncurá Marine Protected Area/Burdwood Bank (54°44'S, 59°56'W).

Specimens in collections. MACN-Pa No. 432/1 (holotype); MACN-Pa Nos. 432/2–7 (paratypes); USNM No. 1393041 (paratypes); MACN-Pa Nos. 750–751 (vouchers).

References. Ivanov (2006), Menoret and Ivanov (2021).

Guidus francoi Menoret & Ivanov, 2021

Type host. *Bathyraja magellanica* (Rajiformes: Arhynchobatidae).

Type locality. Off Río Grande (53°56'S, 66°04'W), Tierra del Fuego Province, Argentina.

Other localities. Off Puerto San Julián (49°29'S, 66°11'W), Santa Cruz Province. Off Río Grande (54°30'S, 65°13'W; 54°24'S, 63°57'W; 54°01'S, 67°06'W; 53°55'S, 67°05'W; 53°36'S, 67°39'W), Tierra del Fuego Province.

Specimens in collections. MACN-Pa No. 739 (holotype); MACN-Pa Nos. 740/1–3, 741/1, 744, 745, 746/1–2, 740/4, 741/2–3, 742/1–3, 743, 746/3–7 (paratypes); IPCAS No. C-887 (paratypes).

Reference. Menoret and Ivanov (2021).

Guidus magellanicus Menoret & Ivanov, 2021

Type host. *Bathyraja magellanica* (Rajiformes: Arhynchobatidae).

Type locality. Off Río Grande (54°01'S, 67°06'W), Tierra del Fuego Province, Argentina.

Other localities. Off Puerto San Julian (49°29'S, 66°11'W), Santa Cruz Province.

Specimens in collections. MACN-Pa No. 747 (holotype); MACN-Pa Nos. 748/1–2, 749/1–2 (paratypes); IPCAS No. C-888 (paratypes).

Reference. Menoret and Ivanov (2021).

***Guidus* sp.**

Host. *Bathyraja multispinis* (Norman) (Rajiformes: Arhynchobatidae).

Locality. Malvinas Islands Shelf, Southwestern Atlantic Ocean.

Reference. Beer et al. (2019).

Comments. These specimens were studied by Beer et al. (2019) at a molecular rather than morphological level, without reaching an identification at the specific level.

Genus *Orygmatobothrium* Diesing, 1863

Orygmatobothrium juani Ivanov, 2008

Type host. *Mustelus fasciatus* (Garman) (Carcharhiniformes: Triakidae).

Typelocality. Puerto Quequén (38°32'S, 58°42'W), Buenos Aires Province, Argentina.

Specimens in collections. MACN-Pa No. 445/1 (holotype); MACN-Pa Nos. 445/2–6 (paratypes).

Reference. Ivanov (2008).

Orygmatobothrium schmitti Suriano & Labriola, 2001

Type host. *Mustelus schmitti* (Carcharhiniformes: Triakidae).

Type locality. Mar del Plata (38°00'S, 57°33'W), Buenos Aires Province, Argentina.

Other locality. Puerto Quequén (38°32'S, 58°42'W), Buenos Aires Province.

Specimens in collections. MACN-Pa Nos. 382/1–2 (holotype and paratype); MNHN 20HG:158 CIX, MNHN 20HG:159 CIX (paratypes); MACN-Pa Nos. 444/1–5 (vouchers).

References. Ostrowski de Núñez (1973), Suriano and Labriola (2001b), Alarcos et al. (2006), Ivanov (2008).

Comments. Ostrowski de Núñez (1973) redescribed *O. velamentum* based on material collected in Mar del Plata. Later, Ivanov (2008) reassigned these specimens to *O. schmitti*.

Genus *Phyllobothrium* Van Beneden, 1850

Phyllobothrium sp.

Hosts. *Sympterygia bonapartii* Müller & Henle (Rajiformes: Rajidae) (as *Psammobatis microps* in Ostrowski de Núñez [1971]), *Myliobatis goodei* (Myliobatiformes: Myliobatidae), *Zapteryx brevirostris* (Rhinopristiformes: Trygonorrhinidae).

Localities. Mar del Plata, Argentina. Río de la Plata estuary near Montevideo, Uruguay.

Specimen in collections. HWML 21001.

References. Ostrowski de Núñez (1971), Brooks et al. (1981).

Comments. Ostrowski de Núñez (1971) registered *Phyllobothrium* sp. from *S. bonapartii* and *Z. brevirostris* in Mar del Plata. Brooks et al. (1981) reported ten specimens of *Phyllobothrium* sp. from *M. goodei* at the Río de la Plata estuary. The deposited material only corresponds to the specimens studied by Brooks et al. (1981).

Genus *Rockacestus* Caira, Bueno & Jensen, 2021

Rockacestus arctowskii (Wojciechowska, 1991)

Phyllobothrium arctowskii Wojciechowska, 1991, *Anthocephalum arctowskii* Rocka & Zdzitowiecki, 1998. Syns.

Type host. *Bathyraja arctowskii* (Dollo) (Rajiformes: Arhynchobatidae) (*Bathyraja* sp. 2).

Type locality. Admiralty Bay, environs of the South Shetlands, Antarctica.

Other locality. Shelf near Elephant Island, Antarctica.

Specimens in collections. MZPW No. 1814 (holotype); BMNH No. 1992.1.6.30 (paratypes).

References. Wojciechowska (1991b), Rocka (2003, 2017), Caira et al. (2021).

Comments. Rocka (2017) established the name *Rajicestus* Rocka & Laskowski, 2017 for cestodes from Antarctic and sub-Antarctic skates described originally in Wojciechowska (1991b) as members of *Phyllobothrium*. Unfortunately, no generic diagnosis or type species was designated; therefore, the name *Rajicestus* is unavailable. Regarding host identification, Stehmann et al. (2021) assigned specimens of *Bathyraja* sp. 2 to *Bathyraja arctowskii*, a wide-ranging, circum-Antarctic species locally common in the Atlantic sector of the Southern Ocean.

Rockacestus conchai Caira, Bueno & Jensen, 2021

Type host. *Bathyraja albomaculata* (Norman) (Rajiformes: Arhynchobatidae).

Type locality. Malvinas Islands (48°39'S, 60°44'W), Southwestern Atlantic Ocean.

Other locality. Malvinas Islands (49°38'S, 59°50'W).

Specimens in collections. NHMUK No. 2020.12.17.1 (holotype); USNM Nos. 1638654, 1638655 (paratypes); LRP Nos. 10293, 10294 (paratypes); LRP Nos. 10279–10281 (SEM vouchers).

GenBank Acc. No. MW419959.

Reference. Caira et al. (2021).

Rockacestus georgiensis (Wojciechowska, 1991)

Phyllobothrium georgiense Wojciechowska, 1991, *Anthocephalum georgiense* Rocka & Zdzitowiecki, 1998. Syns.

Type host. *Amblyraja georgiana* (Rajiformes: Rajidae) (*Raja georgiana*).

Type locality. Shelf around South Georgia, South Atlantic Ocean.

Specimens in collections. MZPW No. 1812 (holotype); No. BMNH No. 1992.1.6.27 (paratype).

References. Wojciechowska (1991b), Rocka (2003, 2017), Caira et al. (2021).

Comments. Rocka (2017) established the name *Rajicestus* for cestodes from Antarctic and sub-Antarctic skates described originally in Wojciechowska (1991b) as members of *Phyllobothrium*. Unfortunately, no generic diagnosis or type species was designated; therefore, the name *Rajicestus* is unavailable.

Rockacestus rakusai (Wojciechowska, 1991)

Phyllobothrium rakusai Wojciechowska, 1991, *Anthocephalum rakusai* Rocka & Zdzitowiecki, 1998. Syns.

Type host. *Bathyraja maccaini* (Rajiformes: Arhynchobatidae).

Type locality. Shelf around Elephant Island and Joinville Island in Bransfield Strait, Antarctica.

Specimens in collections. MZPW No. 1816 (holotype); BMNH No. 1992.1.6.28 (paratype).

References. Wojciechowska (1991b), Rocka (2003, 2017), Caira et al. (2021).

Comments. Rocka (2017) established the name *Rajicestus* for cestodes from Antarctic and sub-Antarctic skates described originally in Wojciechowska (1991b) as members of *Phyllobothrium*. Unfortunately, no generic diagnosis or type species was designated; therefore, the name *Rajicestus* is unavailable.

Rockacestus siedleckii (Wojciechowska, 1991)

Phyllobothrium siedleckii Wojciechowska, 1991, *Anthocephalum siedleckii* Rocka & Zdzitowiecki, 1998. Syns.

Type host. *Bathyraja eatonii* (Rajiformes: Arhynchobatidae).

Type locality. Shelf around Elephant Island and Joinville Island in Bransfield Strait, Antarctica.

Specimens in collections. MZPW No. 1815 (holotype); BMNH No. 1992.1.6.29 (paratype).

References. Wojciechowska (1991b), Rocka (2003, 2017), Caira et al. (2021).

Comments. Rocka (2017) established the name *Rajicestus* for cestodes from Antarctic and sub-Antarctic skates described originally in Wojciechowska (1991b) as members of *Phyllobothrium*. Unfortunately, no generic diagnosis or type species was designated; therefore, the name *Rajicestus* is unavailable.

Phyllobothriidea gen. sp.

Hosts. *Amblyraja doellojuradoi* (Pozzi), *Bathyraja albomaculata*, *B. brachyurops*, *B. cousseauae*, *B. macloviana* (Norman), *B. magellanica*, *B. multispinis*, *B. scaphiops* (Norman), *Dipturus chilensis* (Guichenot), *Psammobatis* sp. 3, *Psammobatis* sp. 2.

Locality. Malvinas Islands Shelf, Southwestern Atlantic Ocean.

Reference. Beer et al. (2019).

Comments. Beer et al. (2019) studied these specimens at the molecular rather than the morphological level, without reaching generic or specific identification. Caira et al. (2021) noted that the specimens of Phyllobothriidea gen. sp. found by Beer et al. (2019) could correspond to the genus *Rockacestus*; however, further molecular and morphological studies are necessary to identify them at the specific level. Beer et al. (2019) also pointed out the presence of Phyllobothriidea gen. sp. parasitizing *D. chilensis*. Nevertheless, the distribution of *D. chilesis* is restricted to the Pacific Ocean; therefore, this record is based on a misidentification of the host (Concha et al. 2019).

Order Rhinebothriidea Healy, Caira, Jensen, Webster & Littlewood, 2009
Family Echeneibothriidae de Beauchamp, 1905
Genus *Echeneibothrium* van Beneden, 1850

***Echeneibothrium cristinae* Franzese, 2022**

Type host. *Bathyraja cousseauae* (Rajiformes: Arhynchobatidae).

Type locality. Isla de los Estados (54°25'S, 65°18'W), Tierra del Fuego Province, Argentina.

Specimens in collections. MACN-Pa No. 734 (holotype); MACN-Pa Nos. 735/1–5, 736/1–23 (paratypes).

Reference. Franzese et al. (2022).

***Echeneibothrium multiloculatum* Carvajal & Dailey, 1975**

Type host. *Dipturus chilensis* (Rajiformes: Rajidae) (*Raja chilensis*).

Other host. *Dipturus brevicaudatus* (Rajiformes: Rajidae).

Type locality. Between Papudo and Talcahuano (between 32°28'S and 37°15'S), Chile.

Other localities. Mar de Ajó (36°34'S, 54°39'W), Mar del Plata (38°05'S, 56°58'W), Quequén (38°35'S, 58°39'W), Buenos Aires Province. San Jorge Gulf (46°13'S, 66°26'W), Santa Cruz Province. Tolhuin (54°29'S, 65°59'W), Río Grande (53°31'S, 67°48'W), Tierra del Fuego Province.

Specimens in collections. USNM No. 1368523 (holotype); USNM No. 1368524 (paratypes); MACN-Pa Nos. 737/1–10, 738, 739, 740/1–8 (vouchers).

GenBank Acc. Nos. MZ594651, MH688748, KY569546, KY569547, KY569548, KY569549.

References. Carvajal and Dailey (1975), Franzese et al. (2022).

Echeneibothrium williamsi Carvajal & Dailey, 1975

Type host. *Dipturus chilensis* (Rajiformes: Rajidae) (*Raja chilensis*).

Other host. *Dipturus brevicaudatus* (Rajiformes: Rajidae).

Type locality. Between Papudo and Talcahuano (between 32°28'S and 37°15'S), Chile.

Other localities. San Jorge Gulf (46°13'S, 66°26'W), Santa Cruz Province. Tolhuin (54°29'S, 65°59'W), Río Grande (53°31'S, 67°48'W), Tierra del Fuego Province. **Puerto Quequén (38°46'S, 57°56'W), Buenos Aires Province** (Table 3).

Specimens in collections. USNM No. 1368521 (holotype); USNM No. 1368522 (paratypes); MACN-Pa Nos. 741/1–14, 742/1–4, 743, **773** (vouchers).

GenBank Acc. Nos. MZ594641, MH688742, KY569542, KY569543, KY569544, KY569545.

References. Carvajal and Dailey (1975), Franzese et al. (2022).

Echeneibothrium sp.

Hosts. *Bathyraja albomaculata*, *B. brachyurops*, *B. cousseauae*, *B. griseocauda* (Norman), *B. macloviana*, *B. multispinis*, *B. scaphiops* (Rajiformes: Arhynchobatidae).

Locality. Malvinas Islands, Southwestern Atlantic Ocean.

Reference. Beer et al. (2019).

Comments. These specimens were studied by Beer et al. (2019) at a molecular rather than morphological level and did not manage to reach an identification at a specific level. Franzese et al. (2022) noted that the specimens of *Echeneibothrium* sp. found in *B. cousseauae* by Beer et al. (2019) at Malvinas Islands could correspond to *E. cristinae*. Considering that the remaining species of *Bathyraja* have not been recorded as hosts for *Echeneibothrium* and that most marine rhinebothriideans show a high degree of specificity to their definitive hosts, Franzese et al. (2022) supposed that some *Echeneibothrium* specimens reported by Beer et al. (2019) could be new species. However, further morphological studies are necessary to identify them at a specific level. Beer et al. (2019) also pointed out the presence of *Echeneibothrium* and *Echeneibothrium* sp. 2 parasitizing *D. chilensis* at Malvinas Islands; however, the distribution of *D. chilesis* is restricted to the Pacific Ocean, i. e. this record has been based on a host misidentification.

Genus *Notomegarhynchus* Ivanov & Campbell, 2002

Notomegarhynchus navonae Ivanov & Campbell, 2002

Type host. *Atlantoraja castelnaui* (Rajiformes: Arhynchobatidae).

Type locality. Mar del Plata (38°00'S, 57°33'W), Buenos Aires Province, Argentina.

Other locality. Puerto Quequén (38°46'S, 57°56'W), Buenos Aires Province (Table 3).

Specimens in collections. MACN-Pa No. 404/1 (holotype); MACN-Pa Nos. 404/2–3 (paratypes); USNM No.1387025 (paratypes); **MACN-Pa No. 774 (voucher)**.

Reference. Ivanov and Campbell (2002).

Notomegarhynchus shetlandicum (Wojciechowska, 1990)

Pseudanthobothrium shetlandicum Wojciechowska, 1990. Syn.

Type host. *Bathyraja eatonii* (Rajiformes: Arhynchobatidae).

Other host. *Bathyraja maccaini* (Rajiformes: Arhynchobatidae).

Specimens in collections. MZPW No. 1810 (holotype); MZPW No. 1811 (paratypes); BMNH No. 1989.4.19.3 (paratypes).

Type locality. South Shetlands region, Joinville shelf, Elephant Island Shelf, and Admiralty Bay, Antarctica.

References. Wojciechowska (1990b), Ivanov and Campbell (2002), Rocka (2003, 2017).

Genus *Pseudanthobothrium* Baer, 1956

Pseudanthobothrium notogeorgianum Wojciechowska, 1990

Type host. *Amblyraja georgiana* (Rajiformes: Rajidae) (*Raja georgiana*).

Type locality. South Georgia area, South Atlantic Ocean.

Specimens in collections. MZPW No. 1807 (holotype); MZPW Nos. 1808–1809 (paratypes); BMNH No. 1989.4.19.2 (paratypes).

References. Wojciechowska (1990b), Rocka (2003, 2017).

Pseudanthobothrium minutum Wojciechowska, 1991

Type host. *Bathyraja eatonii* (Rajiformes: Arhynchobatidae).

Type locality. Elephant Island, Antarctica.

Specimens in collections. No specimens were deposited in a public collection.

References. Wojciechowska (1991a), Rocka (2003, 2017).

Comments. Type specimens are in Wojciechowska's personal collection.

Pseudanthobothrium sp.

Host. *Amblyraja doellojuradoi* (Rajiformes: Rajidae).

Locality. Malvinas Islands, South Atlantic Ocean.

Reference. Beer et al. (2019).

Comments. Beer et al. (2019) indicated the presence of *Pseudanthobothrium* sp. and *Pseudanthobothrium* sp. 2 parasitizing *A. doellojuradoi* at Malvinas Islands.

Family Rhinebothriidae Euzet, 1953
Genus *Rhinebothrium* Linton, 1890

Rhinebothrium chilensis Euzet & Carvajal, 1973

Type host. *Sympterygia lima* (Poeppig) (Rajiformes: Arhynchobatidae) (*Psammobatis lima*).

Other host. *Sympterygia bonapartii* (Rajiformes: Arhynchobatidae).

Type locality. North coast of Chile.

Other localities. Estuary of Bahía Blanca (38°45'S, 62°15'W), Villa Gesell, Necochea, El Rincón, Buenos Aires Province, Argentina. San Matías Gulf, Río Negro Province, Argentina. San Jorge Gulf, Santa Cruz Province, Argentina. Río de La Plata estuary, Uruguay.

Specimens in collections. MNHNC No. 20005 (holotype); MNHNF Nos. Sb 267, Sb 268 (paratypes).

References. Euzet and Carvajal (1973), Tanzola et al. (1998), Irigoitia et al. (2017).

Genus *Scalithrium* Ball, Neifar & Euzet, 2003

Scalithrium ivanovae Franzese, 2021

Type host. *Atlantoraja platana* (Günther) (Rajiformes: Arhynchobatidae).

Type locality. San Matías Gulf (41°11'S, 64°03'W), Río Negro Province, Argentina.

Specimens in collections. MACN-Pa No. 762 (holotype); MACN-Pa Nos. 763/1–4, 764/1–7, 765/1–3 (paratypes); IPCAS No. C-897 (paratypes).

Reference. Franzese and Ivanov (2021).

Scalithrium kirchneri Franzese & Ivanov, 2021

Type host. *Rioraja agassizii* (Müller & Henle) (Rajiformes: Arhynchobatidae).

Type locality. Continental shelf waters off San Clemente del Tuyú (36°12'S, 55°20'W), Buenos Aires Province, Argentina.

Other locality. Continental shelf waters off Quequén (39°56'S, 58°20'W), Buenos Aires Province.

Specimens in collections. MACN-Pa No. 757 (holotype); MACN-Pa Nos. 758/1–13, 759, 760/1–3, 761(paratypes); IPCAS No. C-896 (paratypes).

Reference. Franzese and Ivanov (2021).

Genus incertae sedis and other forms with uncertain family allocations

Genus *Semiorbiseptum* Franzese & Ivanov, 2020

Semiorbiseptum alfredoi Franzese & Ivanov, 2020

Type host. *Psammobatis normani* McEachran (Rajiformes: Arhynchobatidae).

Type locality. Coastal waters off Mar de Ajó (36°34'S, 54°39'W), Buenos Aires Province, Argentina.

Other localities. Coastal waters off Pinamar (37°12'S, 54°53'W), Buenos Aires Province. Caleta Olivia (46°23'S, 64°20'W), Santa Cruz Province.

Specimens in collections. MACN-Pa No. 706 (holotype); MACN-Pa Nos. 707/1–5, 708/1–3, 709, 710, 711/1–2 (paratypes); IPCAS No. C-837/1 (paratypes).

Reference. Franzese and Ivanov (2020b).

Semiorbiseptum mariae Franzese & Ivanov, 2020

Type host. *Psammobatis rudis* Günther (Rajiformes: Arhynchobatidae).

Other host. *Psammobatis normani* (Rajiformes: Arhynchobatidae).

Type locality. Coastal waters off Isla de los Estados (54°30'S, 65°13'W), Tierra del Fuego Province, Argentina.

Other localities. Coastal waters off Río Grande (53°34'S, 66°32'W), Tierra del Fuego Province. Coastal waters off Miramar (39°34'S, 56°16'W), Buenos Aires Province.

Specimens in collections. MACN-Pa No. 701 (holotype); MACN-Pa Nos. 702/1–4, 703, 704/1–13, 705 (paratypes); IPCAS No. C-836/1 (paratypes).

Reference. Franzese and Ivanov (2020b).

Rhinebothriidea gen. sp.

Hosts. *Psammobatis* sp. 1, *Psammobatis* sp. 2, *Psammobatis* sp. 3 (Rajiformes: Arhynchobatidae).

Locality. Malvinas Islands, Southwestern Atlantic Ocean.

References. Beer et al. (2019).

Comments. These cestode specimens were studied by Beer et al. (2019) at a molecular rather than morphological level.

Order "Tetraphyllidea" van Beneden, 1850
Clade 2
Genus *Anthobothrium* van Beneden, 1850

***Anthobothrium galeorhini* Suriano, 2002**

Type host. *Galeorhinus galeus* (Linnaeus) (Carcharhiniformes: Triakidae).
Type locality. Puerto Madryn (42°43'S, 65°00'W), Chubut Province, Argentina.
Specimens in collections. MLP No. 4942 (holotype); MNHN No. 37G (paratype).
Reference. Suriano (2002).

***Anthobothrium* sp.**

Host. *Bathyraja arctowskii* (Rajiformes: Arhynchobatidae) (*Bathyraja* sp. 2).
Locality. Drake Strait near King George Island and environs of Elephant Island, Antarctica.
Reference. Wojciechowska (1991a, b).
Comments. Specimens remain in Wojciechowska's personal collection. Regarding host identification, Stehmann et al. (2021) assigned specimens of *Bathyraja* sp. 2 to *Bathyraja arctowskii*, a wide-ranging, circum-Antarctic species locally common in the Atlantic sector of the Southern Ocean.

Family Calliobothriidae Perrier, 1897
Genus *Calliobothrium* van Beneden, 1850

***Calliobothrium australis* Ostrowski de Núñez, 1973**

Type host. *Mustelus schmitti* (Carcharhiniformes: Triakidae).
Type locality. Mar del Plata, Buenos Aires Province, Argentina.
Other locality. Puerto Quequén (38°32'S, 58°42'W), Provincia de Buenos Aires.
Specimens in collections. MACN No. 409/1 (holotype); MACN Nos. 405/1–4 (vouchers); USNPC No. 92398 (voucher).
GenBank Acc. Nos. KP128030, KP128031.
References. Ostrowski de Núñez (1973), Ivanov and Brooks (2002), Alarcos et al. (2006).
Comments. Ivanov and Brooks (2002) redescribed *C. australis* based on the material studied originally by Ostrowski de Núñez (1973), who considered this species a subspecies of *C. verticillatum*.

Genus *Symcallio* Bernot, Caira & Pickering, 2015

***Symcallio barbarae* (Ivanov & Brooks, 2002)**

Calliobothrium barbarae Ivanov & Brooks, 2002. Syn.

Type host. *Mustelus schmitti* (Carcharhiniformes: Triakidae).

Type locality. Puerto Quequén (38°32'S, 58°42'W), Buenos Aires Province, Argentina.

Other locality. Mar del Plata (38°00'S, 57°33'W), Buenos Aires Province.

Specimens in collections. MACN No. 410/1 (holotype); MACN No. 410/2 (paratypes); USNPC No. 92399 (paratypes).

GenBank Acc. Nos. KP128023.

References. Ivanov and Brooks (2002), Alarcos et al. (2006), Bernot et al. (2015).

Comments. Specimens of *Calliobothrium eschrichti* van Beneden, 1850, identified by Ostrowski de Núñez (1973), were considered by Ivanov and Brooks (2002) as *C. barbarae*. Later, Bernot et al. (2015) transferred *C. barbarae* to the new genus *Symcallio*.

***Symcallio lunae* (Ivanov & Brooks, 2002)**

Calliobothrium lintoni Euzet, 1954, *Calliobothrium lunae* Ivanov & Brooks, 2002. Syns.

Type host. *Mustelus schmitti* (Carcharhiniformes: Triakidae).

Type locality. La Paloma (34°40'S, 54°10'W), Rocha, Uruguay.

Other locality. Mar del Plata (38°00'S, 57°33'W), Buenos Aires Province.

Specimens in collections. MACN No. 411/1 (holotype); MACN Nos. 411/2–5 (paratypes); USNPC No. 92400 (paratypes).

References. Ivanov and Brooks (2002), Alarcos et al. (2006), Bernot et al. (2015).

Clade 4

Genus *Caulobothrium* Baer, 1948

***Caulobothrium ostrowskiae* Brooks, Mayes & Thorson, 1981**

Type host. *Myliobatis goodei* (Myliobatiformes: Myliobatidae).

Type locality. Río de La Plata estuary, near Montevideo, Uruguay.

Specimens in collections. USNM No. 75726 (holotype); USNM No. 75727 (paratype), Univ. Nebraska State Museum No. 21004 (paratype).

Reference. Brooks et al. (1981).

Caulobothrium uruguayense Brooks, Mayes & Thorson, 1981

Type host. Probably *Myliobatis goodei* (Myliobatiformes: Myliobatidae) (*Myliobatis uruguayensis*).

Type locality. Río de la Plata estuary, Uruguay.

Specimens in collections. USNM No. 75724 (holotype); USNM No. 75725 (paratype); Univ. Nebraska State Museum No. 21002.

Reference. Brooks et al. (1981).

Comments. *Caulobothrium uruguayense* was originally described by Brooks et al. (1981) from *Myliobatis uruguayensis*. However, this batoid's name is invalid. Considering original article's title, the type host of this cestode species is probably *M. goodei*.

Order Trypanoryncha Diesing, 1863
Suborder Trypanobatoida Olson, Caira, Jensen, Overstreet, Palm & Beveridge, 2010
Superfamily Eutetrarhynchoidea Guiart, 1927
Genus *Dollfusiella* Campbell & Beveridge, 1994

Dollfusiella acuta Menoret & Ivanov, 2015

Type host. *Sympterygia acuta* Garman (Rajiformes: Arhynchobatidae).

Other hosts. *Atlantoraja castelnaui*, *Atlantoraja platana*, *Sympterygia bonapartii* (Rajiformes: Arhynchobatidae).

Type locality. Off Punta Mejillón (41°11'S, 64°03'W), Río Negro Province, Argentina.

Other localities. off Puerto Quequén (38°37'S, 58°53'W), off Río Colorado (39°55'S, 62°03'W), Bahía Blanca, Buenos Aires Province. San Matías Gulf, Río Negro/Chubut Provinces.

Specimens in collections. MACN-Pa No. 575/1 (holotype); MACN-Pa Nos. 575/2–4 (paratypes); IPCAS No. C-700 (paratypes).

References. Menoret and Ivanov (2015), Irigoitia et al. (2017).

Dollfusiella taminii Menoret & Ivanov, 2014

Type host. *Psammobatis bergi* Marini (Rajiformes: Arhynchobatidae).

Type locality. Puerto Quequén (38°37'S, 58°53'W), Buenos Aires Province, Argentina.

Other locality. off Necochea (38°46'S, 57°56'W), Buenos Aires Province.

Specimens in collections. MACN-Pa No. 544/1 (holotype); MACN-Pa Nos. 544/2–4 (paratypes); IPCAS No. C-661 (paratypes).

Reference. Menoret and Ivanov (2014).

Dollfusiella vooremi (São Clemente & Gomes, 1989)

Eutetranychus vooremi São Clemente & Gomes, 1989. Syn.

Type host. *Mustelus canis* (Mitchill) (Carcharhiniformes: Triakidae).

Other hosts. *Mustelus schmitti* (Carcharhiniformes: Triakidae).

Type locality. Southern Brazilian coast (30°40'S, 53°20'W–50°40'W).

Other localities. Off San Antonio Oeste (40°50'S, 64°58'W), Río Negro Province. Off Mar del Plata (38°00'S, 57°33'W), Buenos Aires Province.

Specimens in collections. CHIOC No. 32.566e (holotype); CHIOC Nos. 32.566a-d (paratypes); MACN-Pa Nos. 543/1–2 (vouchers).

References. São Clemente and Gomes (1989), Tanzola et al. (1998), Alarcos et al. (2006), Menoret and Ivanov (2014).

Genus *Mecistobothrium* Heinz & Dailey, 1974

Mecistobothrium oblongum Menoret & Ivanov, 2015

Type host. *Myliobatis goodei* (Myliobatiformes: Myliobatidae).

Type locality. Off Punta Mejillón (41°11'S, 64°03'W), Río Negro Province, Argentina.

Specimens in collections. MACN-Pa No. 576/1 (holotype); MACN-Pa Nos. 576/2–3 (paratypes).

Reference. Menoret and Ivanov (2015).

Genus *Parachristianella* Dollfus, 1946

Parachristianella damiani Menoret & Ivanov, 2014

Type host. *Myliobatis goodei* (Myliobatiformes: Myliobatidae).

Type locality. Playa Punta Negra (38°36'S, 58°48'W), Necochea, Buenos Aires Province, Argentina.

Specimens in collections. MACN-Pa No. 545/1 (holotype); MACN-Pa No. 545/2 (paratypes), IPCAS No. C-660 (paratypes).

Reference. Menoret and Ivanov (2014).

Superfamily Tentacularoidea Poche, 1926
Genus *Heteronybelinia* Palm, 1999

Heteronybelinia mattisi Menoret & Ivanov, 2012

Type host. *Sympterygia bonapartii* (Rajiformes: Arhynchobatidae).

Type locality. Puerto Quequén (38°37'S, 58°53'W), Buenos Aires Province, Argentina.

Specimens in collections. MACN-Pa No. 537/1 (holotype); MACN-Pa Nos. 537/2–4 (paratypes); NHMUK Nos. 2012.9.11.1–2 (paratypes).

Reference. Menoret and Ivanov (2012a).

Comments. Larval stages (plerocercoids) of *H. mattisi* were reported from teleosts from coastal waters off Buenos Aires Province (Menoret and Ivanov 2012a).

Suborder Trypanoselachoida Olson, Caira, Jensen, Overstreet, Palm & Beveridge, 2010
Superfamily Lacistorhynchoidea Guiart, 1927
Genus *Grillotia* Guiart, 1927

***Grillotia* (*Christianella*) *carvajalregorum* Menoret & Ivanov, 2009**

Progrillotia dollfusi Carvajal & Rego, 1983, *Grillotia* (*Progrillotia*) *dollfusi* (Carvajal & Rego, 1983) Palm 2004, *Grillotia carvajalregorum* Menoret & Ivanov, 2009. Syns.

Type host. *Cynoscion striatus* (Cuvier) (Perciformes: Sciaenidae).

Other host. *Squatina guggenheim* (Squatiniformes: Squatinidae).

Type locality. Coast of Brazil.

Other locality. Puerto Quequén (38°37'S, 58°53'W), Buenos Aires Province.

Specimens in collections. CHIOC No. 32.018a (holotype); CHIOC Nos. 32.018b–d (paratypes); MACN-Pa Nos. 487/1–2 (vouchers).

References. Carvajal and Rego (1983), Menoret and Ivanov (2009, 2012b), Beveridge and Campbell (2010).

Comments. *Grillotia* (*C.*) *carvajalregorum* was originally described from plerocercoids from *C. striatus* at coasts off Brazil (Carvajal and Rego 1983). Later, Menoret and Ivanov (2009) described adults of *G.* (*C.*) *carvajalregorum* from *S. guggenheim* at coasts of Argentina. This species was found in a wide range of teleost fishes (Menoret and Ivanov 2009, 2012b).

***Grillotia* (*Grillotia*) *patagonica* Menoret & Ivanov, 2012**

Type host. *Psammobatis rudis* (Rajiformes: Arhynchobatidae).

Other host. *Sympterygia bonapartii* (Rajiformes: Arhynchobatidae).

Type locality. Off Puerto San Julián (48°59'S, 65°15'W), Santa Cruz Province, Argentina.

Other locality. San Jorge Gulf, Santa Cruz Province.

Specimens in collections. MACN-Pa No. 534/1 (holotype); MACN-Pa Nos. 534/2–4 (paratypes).

References. Menoret and Ivanov (2012b), Irigoitia et al. (2017).

Comments. *Grillotia* (*G.*) *patagonica* was originally described from adults and plerocercoids caught at different localities along the Patagonian Shelf of Argentina (Menoret and Ivanov 2012b). Other reports in the area include this cestode in *S. bonapartii* at San Jorge Gulf (Irigoitia et al. 2017).

Grillotia sp.

Hosts. *Amblyraja doellojuradoi*, *Bathyraja brachyurops*, *B. cousseauae*, *B. griseocauda*, *Bathyraja magellanica*, *Dipturus chilensis*, *Psammobatis* sp. 2, *Psammobatis* sp. 3.

Locality. Malvinas Islands Shelf, Southwestern Atlantic Ocean.

Reference. Beer et al. (2019).

Comments. These specimens were studied by Beer et al. (2019) at a molecular rather than a morphological level, without reaching a specific identification. Beer et al. (2019) noted the presence of *Grillotia* sp. parasitizing *D. chilensis*. However, the distribution of *D. chilesis* is restricted to the Pacific Ocean. Therefore, this record was based on a misidentified host (Concha et al. 2019).

Species incertae sedis (at the ordinal level)

Phyllobothrium myliobatidis Brooks, Mayes & Thorson, 1981

Type host. *Myliobatis goodei* (Myliobatiformes: Myliobatidae).

Type locality. Río de la Plata estuary, Uruguay.

Specimens in collections. USNM No. 1371266 (holotype); USNM No. 1371267 (paratype).

Reference. Brooks et al. (1981).

Comments. Ruhnke (2011) considers *P. myliobatidis* as a possible member of the order Rhinebothriidea.

Host-parasite checklist: chimaeras and batoids

Order Chimaeriformes
- **Family Callorhinchidae**
  - ***Callorhinchus callorynchus***
    - *Gyrocotyle maxima* (Gyrocotylidea)
    - *Gyrocotyle rugosa* (Gyrocotylidea)

Order Myliobatiformes
- **Family Myliobatidae**
  - ***Myliobatis goodei***
    - *Aberrapex arrhynchum* (Lecanicephalidea)
    - *Aberrapex ludmilae* (Lecanicephalidea)
    - *Aberrapex sanmartini* (Lecanicephalidea)
    - *Acanthobothrium* sp. (Onchoproteocephalidea)
    - *Caulobothrium ostrowskiae* ("Tetraphyllidea")
    - *Caulobothrium uruguayense* ("Tetraphyllidea")
    - *Halysioncum megacanthum* (Diphyllidea)
    - *Mecistobothrium oblongum* (Trypanorhyncha)

Parachristianella damiani (Trypanorhyncha)
Phyllobothrium myliobatidis (Incertae sedis)
Phyllobothrium sp. (Phyllobothriidea)
Myliobatis ridens
Aberrapex vitalemuttiorum (Lecanicephalidea)
Order Rajiformes
Family Arhynchobatidae
Atlantoraja castelnaui
Acanthobothrium marplatensis (Onchoproteocephalidea)
Dollfusiella acuta (Trypanorhyncha)
Notomegarhynchus navonae (Rhinebothriidea)
Atlantoraja platana
Dollfusiella acuta (Trypanorhyncha)
Scalithrium ivanovae (Rhinebothriidea)
Bathyraja albomaculata
Echeneibothrium sp. (Rhinebothriidea)
Rockacestus conchai (Phyllobothriidea)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Bathyraja arctowskii
Anthobothrium sp. ("Tetraphyllidea")
Rockacestus arctowskii (Phyllobothriidea)
Bathyraja brachyurops
Echeneibothrium sp. (Rhinebothriidea)
Grillotia sp. (Trypanorhyncha)
Guidus argentinense (Phyllobothriidea)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Bathyraja cousseauae
Acanthobothrium sp. (Onchoproteocephalidea)
Echeneibothrium cristinae (Rhinebothriidea)
Echeneibothrium sp. (Rhinebothriidea)
Grillotia sp. (Trypanorhyncha)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Bathyraja eatonii
Guidus antarcticus (Phyllobothriidea)
Notomegarhynchus shetlandicum (Rhinebothriidea)
Onchobothrium antarcticum (Onchoproteocephalidea)
Pseudanthobothrium minutum (Rhinebothriidea)
Rockacestus siedleckii (Phyllobothriidea)
Bathyraja griseocauda
Echeneibothrium sp. (Rhinebothriidea)
Grillotia sp. (Trypanorhyncha)
Bathyraja maccaini
Guidus antarcticus (Phyllobothriidea)

Notomegarhynchus shetlandicum (Rhinebothriidea)
Rockacestus rakusai (Phyllobothriidea)
Bathyraja macloviana
Echeneibothrium sp. (Rhinebothriidea)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Bathyraja magellanica
Acanthobothrium carolinae (Onchoproteocephalidea)
Acanthobothrium sp. (Onchoproteocephalidea)
Grillotia sp. (Trypanorhyncha)
Guidus francoi (Phyllobothriidea)
Guidus magellanicus (Phyllobothriidea)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Bathyraja multispinis
Echeneibothrium sp. (Rhinebothriidea)
Guidus sp. (Phyllobothriidea)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Bathyraja scaphiops
Echeneibothrium sp. (Rhinebothriidea)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Psammobatis bergi
Dollfusiella taminii (Trypanorhyncha)
Psammobatis normani
Semiorbiseptum alfredoi (Rhinebothriidea)
Semiorbiseptum mariae (Rhinebothriidea)
Psammobatis rudis
Grillotia (*G.*) *patagonica* (Trypanorhyncha)
Semiorbiseptum mariae (Rhinebothriidea)
***Psammobatis* sp. 1**
Rhinebothriidea gen. sp. (Rhinebothriidea)
***Psammobatis* sp. 2**
Grillotia sp. (Trypanorhyncha)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Rhinebothriidea gen. sp. (Rhinebothriidea)
***Psammobatis* sp. 3**
Grillotia sp. (Trypanorhyncha)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Rhinebothriidea gen. sp. (Rhinebothriidea)
Rioraja agassizii
Scalithrium kirchneri (Rhinebothriidea)
Sympterygia acuta
Dollfusiella acuta (Trypanorhyncha)
Sympterygia bonapartii
Dollfusiella acuta (Trypanorhyncha)
Grillotia (*G.*) *patagonica* (Trypanorhyncha)

Heteronybelinia mattisi (Trypanorhyncha)
Phyllobothrium sp. (Phyllobothriidea)
Rhinebothrium chilensis (Rhinebothriidea)

Family Rajidae

Amblyraja doellojuradoi
Grillotia sp. (Trypanorhyncha)
Phyllobothriidea gen. sp. (Phyllobothriidea)
Pseudanthobothrium sp. (Rhinebothriidea)

Amblyraja georgiana
Echinobothrium acanthocolle (Diphyllidea)
Pseudanthobothrium notogeorgianum (Rhinebothriidea)
Rockacestus georgiensis (Phyllobothriidea)

Dipturus brevicaudatus
Acanthobothrium domingae (Onchoproteocephalidea)
Echeneibothrium multiloculatum (Rhinebothriidea)
Echeneibothrium williamsi (Rhinebothriidea)

Order Rhinopristiformes

Family Trygonorrhinidae

Zapteryx brevirostris
Acanthobothrium zapterycum (Onchoproteocephalidea)
Acanthobothrium sp. (Onchoproteocephalidea)
Halysioncum pigmentatum (Diphyllidea)
Phyllobothrium sp. (Phyllobothriidea)

Order Torpediniformes

Family Narcinidae

Discopyge tschudii
Acanthobothrium stefaniae (Onchoproteocephalidea)

Host-parasite checklist: sharks

Order Carcharhiniformes

Family Carcharhinidae

Carcharhinus brachyurus
Cathetocephalus australis (Cathetocephalidea)

Family Triakidae

Galeorhinus galeus
Anthobothrium galeorhini ("Tetraphyllidea")

Mustelus fasciatus
Orygmatobothrium juani (Phyllobothriidea)

Mustelus schmitti
Calliobothrium australis ("Tetraphyllidea")
Coronocestus notoguidoi (Diphyllidea)
Dollfusiella vooremi (Trypanorhyncha)

Orygmatobothrium schmitti (Phyllobothriidea)
Symcallio barbarae ("Tetraphyllidea")
Symcallio lunae ("Tetraphyllidea")

Order Hexanchiformes
Family Hexanchidae
Notorynchus cepedianus
Crossobothrium antonioi (Phyllobothriidea)
Crossobothrium pequeae (Phyllobothriidea)

Order Squatiniformes
Family Squatinidae
Squatina guggenheim
Grillotia (*C.*) *carvajalregorum* (Trypanorhyncha)
Paraberrapex atlanticus (Lecanicephalidea)

Geographical distribution of the cestode orders

The tapeworm orders reviewed in this study show different geographical ranges. These distributions are represented in Fig. 1A for the Phyllobothriidea, Fig. 1B for the Onchoproteocephalidea, Fig. 2A for the Rhinebothriidea, Fig. 2B for "Tetraphyllidea" and Gyrocotylidea, Fig. 3A for the Diphyllidea and Lecanicephalidea, and Fig. 3B for Trypanorhyncha. Geographical sites of the order Cathetocephalidea could not be rep-

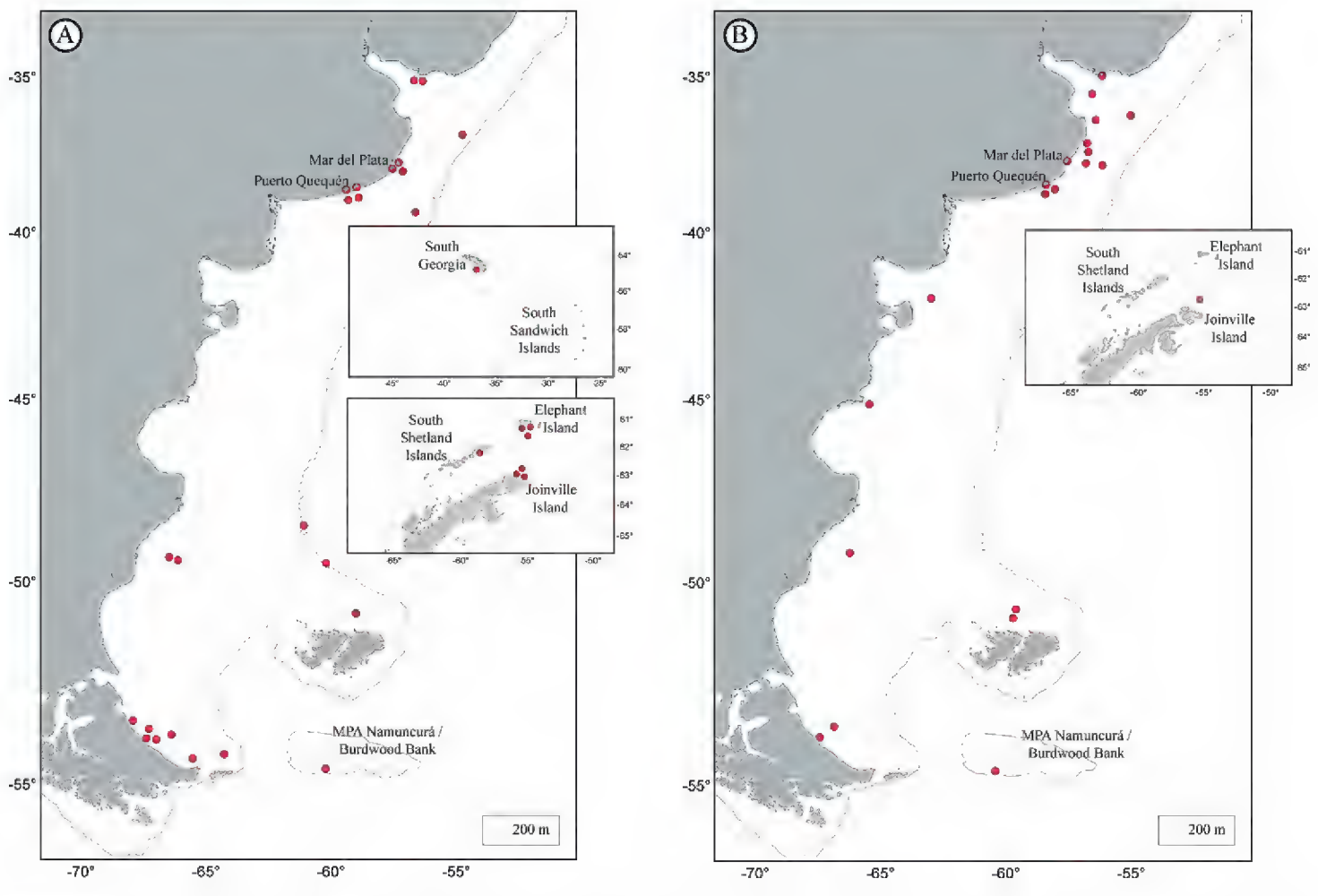

Figure 1. Distribution of representatives of the orders Phyllobothriidea and Onchoproteocephalidea **A** order Phyllobothriidea **B** order Onchoproteocephalidea. Insets show records in the sub-Antarctic and Antarctic regions.

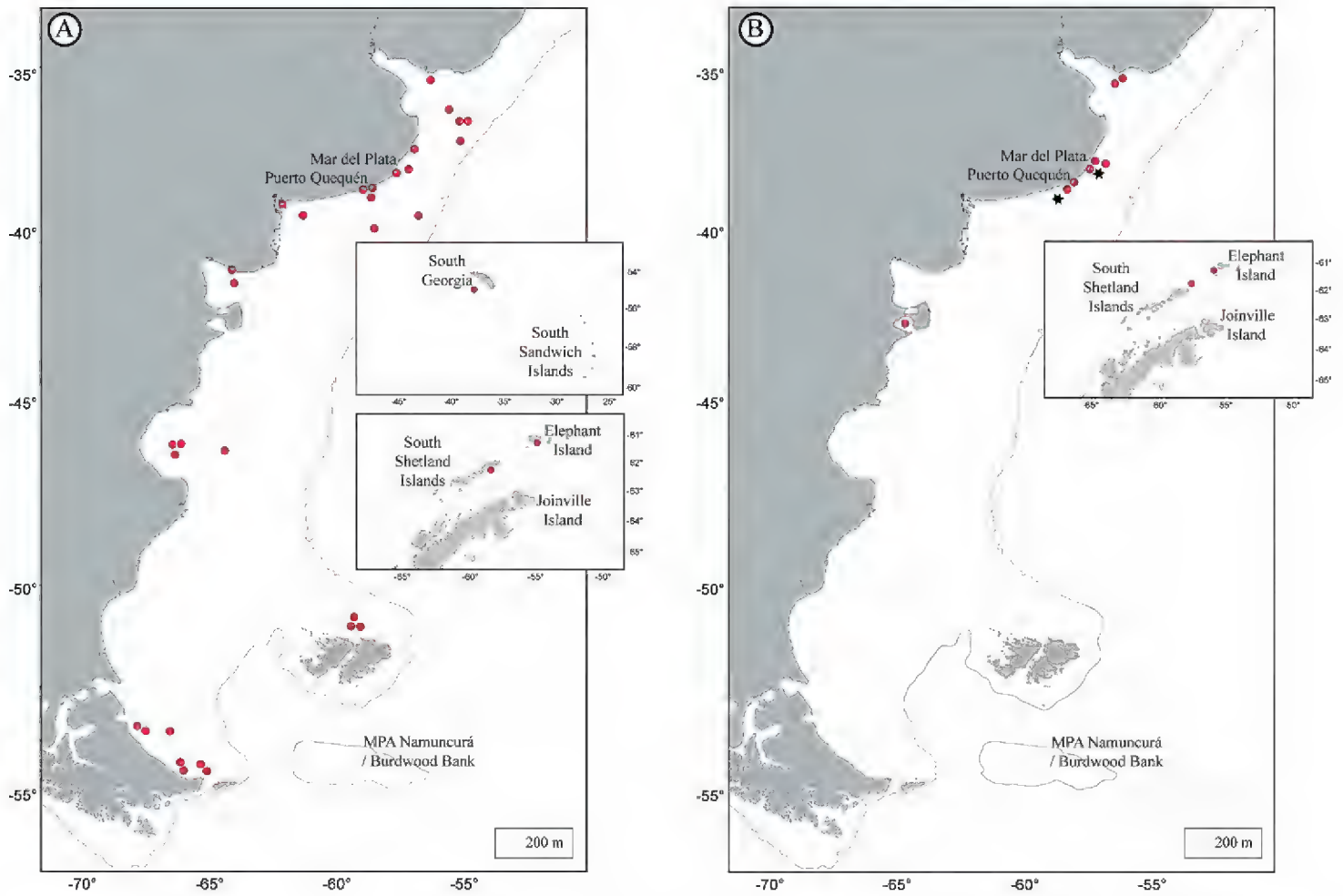

Figure 2. Distribution of representatives of the orders Rhinebothriidea, "Tetraphyllidea" and Gyrocotylidea **A** order Rhinebothriidea **B** red dot Orders "Tetraphyllidea" and black star Gyrocotylidea. Insets show records in the sub-Antarctic and Antarctic regions.

resented since the only existing record reports *Cathetocephalus australis* in Argentina, without specifying the locality or coordinate.

The orders with the broadest geographic distributions are Onchoproteocephalidea (Fig. 1B) and Rhinebothriidea (Fig. 2A), with representatives in the Río de la Plata estuary, along the Argentine Sea, and the southern islands. In addition, the phyllobothriideans (Fig. 1A) show a similar distribution, although without records between the 40°S–47°S latitudes, in the central region of the Argentine Sea. On the other hand, the cestodes with the narrowest distribution are those of the order Gyrocotylidea (Fig. 2B), being recorded only in two locations in the Buenos Aires Province.

Discussion

Cestode diversity

Cestodes as parasites of chondrichthyans have been mostly recorded in the Northern Hemisphere (Caira et al. 2022). However, reports in southern latitudes have remarkably increased in the last decades due to focused sampling efforts in the area (Menoret and Ivanov 2012a, b, 2014, 2015, 2021; Pickering and Caira 2012; Caira et al. 2013a; Abbott and Caira 2014; Mutti and Ivanov 2016; Menoret et al. 2017; Franzese and

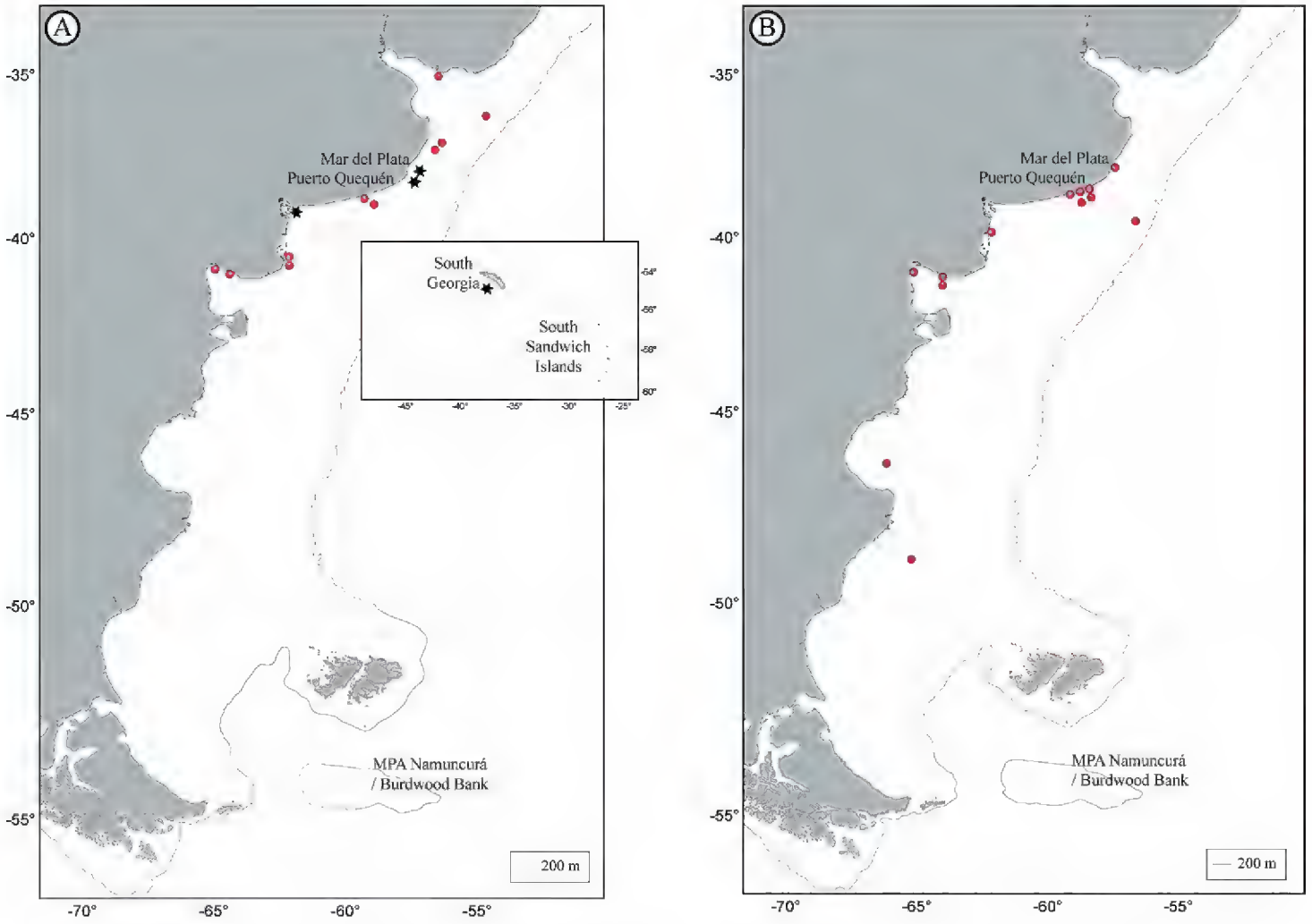

Figure 3. Distribution of the orders Diphyllidea, Lecanicephalidea and Trypanorhyncha **A** black star Diphyllidea and red dot Lecanicephalidea **B** order Trypanorhyncha. Inset shows records in the sub-Antarctic region.

Ivanov 2018, 2020a, b, 2021; Palm et al. 2019; Oosthuizen et al. 2021; Franzese et al. 2022; Van Der Spuy et al. 2022). The present annotated checklist comprises 57 valid cestode species of 28 genera in nine orders, registered in the Río de la Plata estuary, Southwestern Atlantic off Argentina and the surrounding waters off Antarctica. The orders Phyllobothriidea and Rhinebothriidea show the highest richness at the specific level, with 13 and 12 valid species, respectively; they are followed by the order Trypanorhyncha, with a total of eight species. In addition, the list includes cestodes without an identification up to the generic or the specific level, as in the case of the Onchoproteocephalidea (i.e., *Acanthobothrium* sp.), Phyllobothriidea (i.e., Genus sp., *Guidus* sp., *Phyllobothrium* sp.), Rhinebothriidea (i.e., Genus sp., *Echeneibothrium* sp., *Pseudanthobothrium* sp.) and Trypanorhyncha (i.e., *Grillotia* sp.) (Ostrowski de Núñez 1971; Brooks et al. 1981; Beer et al. 2019). Several of the comments made in this work are intended to aid in future morphological and molecular studies addressing the lower taxonomic resolution of these entities.

In view of the high degree of specificity of adult cestodes to their marine hosts (Reyda and Marques 2011; Caira and Jensen 2017) and that only 33% (33/100) of marine chondrichthyans in the study area have been sampled for cestodes (Table 1),

this fauna is probably underestimated. We can speculate that more than 60 species of cestodes have not yet been discovered in this area. Future taxonomic surveys will be essential to increase the knowledge of the diversity of these parasites in the region.

Taxonomic resolution

The poor taxonomic resolution of several taxa listed in the present study is probably a consequence of the lack of use of multiple tools to develop an integrative taxonomy, such as morphological and molecular studies used as evidence to delineate species boundaries. Some of the previous works cited here lacked modern morphological tools, e.g., scanning (SEM) and transmission electron microscopy (TEM) and the molecular tools necessary for the development of an integrative approach (Ostrowski de Núñez 1971; Brooks et al. 1981). In contrast, the recent work by Beer et al. (2019) recorded in the Argentine Sea numerous specimens of cestodes belonging to different orders but without achieving a specific identification for many of them, using molecular sequences as the only identification tool. The development and use of molecular tools have allowed the detection of cryptic species in some cestode groups (Scholz et al. 2014; Choudhury and Scholz 2020). Of the 57 valid species recorded in this work, only seven have been sequenced, so it is still unknown whether cryptic species will be discovered in this particular region. In addition to molecular sequences, the use of modern morphological tools, such as SEM and TEM, might be helpful in discovering new characters that complement traditional morphological studies, which could contribute to solve species identification problems (Franzese et al. 2023; Mutti et al. 2023). The development of the integrative taxonomy, including the use of all available tools, will allow resolving the poor taxonomic resolution observed in several taxa registered in our study area.

Host association

Rajiform batoids represent the most frequent hosts for adult cestodes in the study area. In particular, the family Arhynchobatidae has been found parasitized by 42% (24/57) of the recorded cestode species (Ivanov and Campbell 1998b, 2002; Rocka 2003; Menoret and Ivanov 2012a, 2014, 2021; Irigoitia et al. 2017; Franzese and Ivanov 2020a, b; Caira et al. 2021; Franzese et al. 2022). This percentage could be higher since many species of arhynchobatids of the region, such as *Atlantoraja cyclophora* (Regan), *Bathyraja meridionalis* Stehmann, *Bathyraja papilionifera* Stehmann, *Bathyraja schroederi* (Krefft), *Psammobatis extenta* (Garman), *Psammobatis lentiginosa* McEachran, *Psammobatis parvacauda* McEachran, *Psammobatis rutrum* Jordan, and *Psammobatis scobina* (Philippi), have not yet been sampled for cestodes. The association between tapeworms and this host family is not surprising if we consider that arhynchobatids have the highest species number, with 31% (31/100) of the chondrichthyan fauna recorded in the area (Table 1) (Menni and Lucifora 2007; Froese and Pauly 2022). Upcoming studies should focus on sampling arhyncobatids that have not yet been reported as hosts for tapeworms.

Considering that the major number of cestode species from this checklist are hosted by the myliobatiform *Myliobatis goodei* (Brooks et al. 1981; Ivanov and Campbell 1998a; Menoret and Ivanov 2014, 2015; Menoret et al. 2017), it would be interesting to sample *M. freminvillei* Lesueur, the only species of myliobatid that has not been yet examined for cestodes in the region. On the other hand, only 13% (6/45) of the species of sharks have been reported as hosts in this area (Table 1). Host species with a relatively low occurrence or a particular bathymetric distribution are likely to host an undiscovered and exciting cestode fauna.

More collecting efforts are necessary to conclude if this data reflects the actual biodiversity of cestodes in the different groups of chondrichthyans or is a result of a bias in sampling. Although this list shows the substantial advances in taxonomical surveys in the last decades, expanding the number of sampled hosts is essential to increase the knowledge of the current cestode fauna of chondrichthyans in the region.

Studied area and newly collected material

Five species of cestodes have been recorded in new localities of the Southwestern Atlantic Ocean (Table 3). New material (voucher) identified, processed, and deposited in the MACN parasitological collection corresponds to three onchoproteocephalideans (i.e., *Acanthobothrium domingae*, *A. marplatensis*, *A. stefaniae*) and two rhinebotriideans (i.e., *Echeneibothrium williamsi*, *Notomegarhynchus navonae*). One of these records has extended until the Buenos Aires Province the northern limit of the known geographic distribution in the Argentine Sea of *E. Williamsi*, which, prior to this work, ranged from Santa Cruz Province to Tierra del Fuego Province (Franzese et al. 2022). The remaining new records have added new localities within the province of Buenos Aires for *A. domingae*, *A. marplatensis*, *A. stefaniae*, and *N. navonae*. Previously, these four species had been reported off Buenos Aires, although in different locations (Ivanov and Campbell 1998b, 2002; Franzese and Ivanov 2018, 2020a).

Several of the original descriptions of cestode species are based on material collected from a single locality. However, this probably reflects the absence of a more exhaustive sampling. The present checklist shows that about half of the species included in this region have additional localities. Among these, *Rhinebothrium chilensis* and *Echeneibothrium williamsi* show the highest number with 7 and 6 localities, respectively (Tanzola et al. 1998; Irigoitia et al. 2017). It is likely that as the intensity of sampling increases, new localities will be discovered for several known cestode species.

The localities with the most significant number of cestodes species are Puerto Quequén and Mar del Plata, with 17 and 11 species reported to date, respectively. A strong sampling effort could explain these numbers since both sites are commercial ports from the Buenos Aires Province close to the facilities of the main Argentinean research taxonomic cestodes groups (Luque and Poulin 2007; Randhawa and Poulin 2019).

Conclusions

Some difficulties concerning the understanding of chondrichthyan cestode diversity are:

1) many works have a poor taxonomic resolution or are outdated, with incomplete drawings and without the use of modern tools such as transmission electron microscopy, scanning electron microscopy and molecular approaches;
2) the existence of cryptic species underestimates the actual number of cestodes;
3) less than half of the marine chondrichthyans have been examined for cestodes in the area covered in this work.

A modern taxonomic approach for future characterizations should be made by combining descriptive tools (e.g., TEM and SEM, molecular data, histological sections, and histochemical techniques). It would also be desirable that all the voucher material could be available in public parasitological collections to facilitate its study to the entire community of taxonomists. Regarding sampling effort, it is likely that the higher the number of chondrichthyans examined in parasitological surveys, the higher the number of parasite-host associations will be identified. We have critically compiled as much detailed information as possible including valuable comments, providing a complete list of references and information from the deposited material. We hope this list may help future studies and contributes to correctly estimating the cestode biodiversity that inhabits this underexplored region of the Southern Hemisphere.

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References

Abbott LM, Caira JN (2014) Morphology meets molecules: A new genus and two new species of diphyllidean cestodes from the yellowspotted skate, *Leucoraja wallacei*, from South Africa. The Journal of Parasitology 100(3): 323–330. https://doi.org/10.1645/13-414.1

Alarcos AJ, Ivanov VA, Sardella NH (2006) Distribution patterns and interactions of cestodes in the spiral intestine of the narrownose smooth-hound shark, *Mustelus schmitti* Springer, 1939 (Chondrichthyes, Carcharhiniformes). Acta Parasitologica 51(2): 100–106. https://doi.org/10.2478/s11686-006-0015-7

Alves PV, de Chambrier A, Scholz T, Luque JL (2017) Annotated checklist of fish cestodes from South America. ZooKeys 650: 1–205. https://doi.org/10.3897/zookeys.650.10982

Barčák D, Fan CK, Sonko P, Kuchta R, Scholz T, Orosová M, Chen HW, Oros M (2021) Hidden diversity of the most basal tapeworms (Cestoda, Gyrocotylidea), the enigmatic parasites of holocephalans (Chimaeriformes). Scientific Reports 11(1): 1–11. https://doi.org/10.1038/s41598-021-84613-y

Beer A, Ingram T, Randhawa HS (2019) Role of ecology and phylogeny in determining tapeworm assemblages in skates (Rajiformes). Journal of Helminthology 93(6): 738–751. https://doi.org/10.1017/S0022149X18000809

Bernot JP, Caira JN, Pickering M (2015) The dismantling of *Calliobothrium* (Cestoda: Tetraphyllidea) with erection of *Symcallio* n. gen. and description of two new species. The Journal of Parasitology 101(2): 167–181. https://doi.org/10.1645/14-571.1

Beveridge I, Campbell RA (2010) Validation of *Christianella* Guiart, 1931 (Cestoda: Trypanorhyncha) and its taxonomic relationship with *Grillotia* Guiart, 1927. Systematic Parasitology 76(2): 111–129. https://doi.org/10.1007/s11230-010-9239-x

Bigatti G, Signorelli J (2018) Marine invertebrate biodiversity from the Argentine Sea, South Western Atlantic. ZooKeys 791: 47–70. https://doi.org/10.3897/zookeys.791.22587

Brooks DR, Mayes MA, Thorson TB (1981) Cestode parasites in *Myliobatis goodei* Garman (Myliobatiformes: Myliobatidae) from Río de la Plata, Uruguay, with a summary of cestodes collected from South American elasmobranchs during 1975–1979. Proceedings of the Biological Society of Washington 93: 1239–1252.

Caira JN, Jensen K (2014) A digest of elasmobranch tapeworms. The Journal of Parasitology 100(4): 373–391. https://doi.org/10.1645/14-516.1

Caira JN, Jensen K (2017) Planetary biodiversity inventory (2008–2017): Tapeworms from vertebrate bowels of the earth. Natural History Museum, University of Kansas, Kansas, 463 pp.

Caira JN, Pickering M, Schulman AD, Hanessian IV NJ (2013a) Two new species of *Echinobothrium* (Cestoda: Diphyllidea) from batoids off South Africa. Comparative Parasitology 80(1): 22–32. https://doi.org/10.1654/4598.1

Caira JN, Marques FPL, Jensen K, Kuchta R, Ivanov V (2013b) Phylogenetic analysis and reconfiguration of genera in the cestode order Diphyllidea. International Journal for Parasitology 43(8): 621–639. https://doi.org/10.1016/j.ijpara.2013.03.001

Caira JN, Bueno V, Jensen K (2021) Emerging global novelty in phyllobothriidean tapeworms (Cestoda: Phyllobothriidea) from sharks and skates (Elasmobranchii). Zoological Journal of the Linnean Society 193(4): 1336–1363. https://doi.org/10.1093/zoolinnean/zlaa185

Caira JN, Jensen K, Barbeau E [Eds] (2022) Global Cestode Database. World Wide Web electronic publication. http://www.tapewormdb.uconn.edu [Accessed 1 December 2022]

Carvajal J, Dailey MD (1975) Three new species of *Echeneibothrium* (Cestoda: Tetraphyllidea) from the skate, *Raja chilensis* Guichenot, 1848, with comments on mode of at-

tachment and host specificity. The Journal of Parasitology 61(1): 89–94. https://doi.org/10.2307/3279115

Carvajal J, Rego AA (1983) *Progrillotia dollfusi* sp. n. (Cestoda: Trypanorhyncha) parasito de pescada do litoral brasileiro. Memorias do Instituto Oswaldo Cruz 78(2): 231–234. https://doi.org/10.1590/S0074-02761983000200012

Choudhury A, Scholz T (2020) Ex uno plures? Morphotype and lineage diversity of *Bothriocephalus* (Cestoda: Bothriocephalidea) in North American freshwater fishes. The Journal of Parasitology 106(5): 589–602. https://doi.org/10.1645/17-98

Concha FJ, Caira JN, Ebert DA, Pompert JHW (2019) Redescription and taxonomic status of *Dipturus chilensis* (Guichenot, 1848), and description of *Dipturus lamillai* sp. nov. (Rajiformes: Rajidae), a new species of long-snout skate from the Falkland Islands. Zootaxa 4590(5): 501–524. https://doi.org/10.11646/zootaxa.4590.5.1

Dulvy NK, Fowler SL, Musick JA, Cavanagh RD, Kyne PM, Harrison LR, Carlson JK, Davidson LNK, Fordham SV, Francis MP, Pollock CM, Simpfendorfer CA, Burgess GH, Carpenter KE, Compagno LJV, Ebert DA, Gibson C, Heupel MR, Livingstone SR, Sanciangco JC, Stevens JD, Valenti S, White WT (2014) Extinction risk and conservation of the world's sharks and rays. eLife 3: e00590. https://doi.org/10.7554/eLife.00590

Euzet L, Carvajal J (1973) *Rhinebothrium* (Cestoda, Tetraphyllidea) parasites de raies du genre *Psammobatis* au Chili. Bulletin du Muséum National d'Histoire Naturelle 101: 779–787.

Franzese S, Ivanov VA (2018) Hyperapolytic species of *Acanthobothrium* (Cestoda: Onchoproteocephalidea) from batoids off Argentina. Parasitology International 67(4): 431–443. https://doi.org/10.1016/j.parint.2018.04.001

Franzese S, Ivanov VA (2020a) Two new species of *Acanthobothrium* Blanchard, 1848 (Cestoda: Onchoproteocephalidea) from rajiform batoids off Argentina. Folia Parasitologica 67: 016. https://doi.org/10.14411/fp.2020.016

Franzese S, Ivanov VA (2020b) A new genus of *Rhinebothriidea* from species of *Psammobatis* (Rajiformes: Arhynchobatidae) off Argentina. Zootaxa 4803(2): 355–372. https://doi.org/10.11646/zootaxa.4803.2.7

Franzese S, Ivanov VA (2021) Two new species of *Scalithrium* (Cestoda: Rhinebothriidea) from rajiform batoids of the Argentine Sea. Zootaxa 5005(1): 62–76. https://doi.org/10.11646/zootaxa.5005.1.4

Franzese S, Mutti LD, Tropea C, Ivanov VA (2022) Morphological study of members of the genus *Echeneibothrium* (Cestoda: Rhinebothriidea: Echeneibothriidae) from rajiform skates of the Argentine Sea and analysis of the phylogenetic relationships within the family Echeneibothriidae. Zoologischer Anzeiger 299: 1–20. https://doi.org/10.1016/j.jcz.2022.05.002

Franzese S, Mutti LD, Battista AG, Ivanov VA (2023) Morphology and glandular composition of the myzorhynchus and the remnant apical organ in adult cestodes of the order Rhinebothriidea from batoids off Argentina. Journal of Morphology 284(4): e21573. https://doi.org/10.1002/jmor.21573

Froese R, Pauly D [Eds] (2022) FishBase. World Wide Web electronic publication. http://www.fishbase.org [Accessed 30 November 2022]

Gabbanelli V, Diaz de Astarloa JM, González-Castro M, Vazquez DM, Mabragaña E (2018) Almost a century of oblivion: Integrative taxonomy allows the resurrection of the longnose skate *Zearaja brevicaudata* (Marini, 1933) (Rajiformes; Rajidae). Comptes Rendus Biologies 341(9–10): 454–470. https://doi.org/10.1016/j.crvi.2018.10.002

Irigoitia MM, Incorvaia IS, Timi JT (2017) Evaluating the usefulness of natural tags for host population structure in chondrichthyans: Parasite assemblages of *Sympterygia bonapartii* (Rajiformes: Arhynchobatidae) in the Southwestern Atlantic. Fisheries Research 195: 80–90. https://doi.org/10.1016/j.fishres.2017.07.006

Irigoitia MM, Levy E, Canel D, Timi JT (2022) Parasites as tags for stock identification of a highly exploited vulnerable skate *Dipturus brevicaudatus* (Chondrichthyes: Rajidae) in the south-western Atlantic Ocean, a complementary tool for its conservation. Aquatic Conservation 32(10): 1634–1646. https://doi.org/10.1002/aqc.3869

Ivanov VA (1997) *Echinobothrium notoguidoi* n. sp. (Cestoda: Diphyllidea) from *Mustelus schmitti* (Chondrichthyes: Carcharhiniformes) in the Argentine Sea. The Journal of Parasitology 83(5): 913–916. https://doi.org/10.2307/3284288

Ivanov VA (2006) *Guidus* n. gen. (Cestoda: Tetraphyllidea), with description of a new species and emendation of the generic diagnosis of *Marsupiobothrium*. The Journal of Parasitology 92(4): 832–840. https://doi.org/10.1645/GE-767R.1

Ivanov VA (2008) *Orygmatobothrium* spp. (Cestoda: Tetraphyllidea) from triakid sharks in Argentina: Redescription of *Orygmatobothrium schmitti* and description of a new species. The Journal of Parasitology 94(5): 1087–1097. https://doi.org/10.1645/GE-1482.1

Ivanov VA (2009) New species of *Crossobothrium* (Cestoda: Tetraphyllidea) from the broadnose sevengill shark, *Notorynchus cepedianus*, in Argentina. The Journal of Parasitology 95(6): 1479–1488. https://doi.org/10.1645/GE-2096.1

Ivanov VA, Brooks DR (2002) *Callliobothrium* spp. (Eucestoda: Tetraphyllidea: Onchobothriidae) in *Mustelus schmitti* (Chondrichthyes: Carcharhiniformes) from Argentina and Uruguay. The Journal of Parasitology 88(6): 1200–1213. https://doi.org/10.1645/0022-3395(2002)088[1200:CSETOI]2.0.CO;2

Ivanov VA, Campbell RA (1998a) *Echinobothrium megacanthum* sp. n. (Cestoda: Diphyllidea) from the eagle ray *Myliobatis goodei* (Chondrichthyes: Rajoidei) from the Patagonian shelf of Argentina. Folia Parasitologica 45: 225–229.

Ivanov VA, Campbell RA (1998b) A new species of *Acanthobothrium* van Beneden, 1849 (Cestoda: Tetraphyllidea) from *Rioraja castelnaui* (Chondrichthyes: Rajoidei) in coastal waters of Argentina. Systematic Parasitology 40(3): 203–212. https://doi.org/10.1023/A:1006049404646

Ivanov VA, Campbell RA (2002) *Notomegarhynchus navonae* n. gen. and n. sp. (Eucestoda: Tetraphyllidea), from skates (Rajidae: Arhychobatinae) in the Southern Hemisphere. The Journal of Parasitology 88(2): 340–349. https://doi.org/10.1645/0022-3395(2002)088[0340:NNNGAN]2.0.CO;2

Jensen K (2001) Four new genera and five new species of lecanicephalideans (Cestoda: Lecanicephalidea) from elasmobranchs in the Gulf of California, Mexico. The Journal of Parasitology 87(4): 845–861. https://doi.org/10.1645/0022-3395(2001)087[0845:FNGAFN]2.0.CO;2

Luque JL, Poulin R (2007) Metazoan parasite species richness in Neotropical fishes: Hotspots and the geography of biodiversity. Parasitology 134(6): 865–878. https://doi.org/10.1017/S0031182007002272

MacDonagh J (1927) Parasitos de peces comestibles III. Dos cestodarios: *Gyrocotyle rugosa* del "Pez gallo" y *Gyrocotyle maxima* n. sp. del "Gatuso". La Semana Médica Buenos Aires 34: 1232–1235.

Menni RC, Lucifora LO (2007) Condrictios de la Argentina y Uruguay: lista de trabajo. Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata, 15 pp.

Menoret A, Ivanov VA (2009) New name for *Progrillotia dollfusi* Carvajal et Rego, 1983 (Cestoda: Trypanorhyncha): description of adults from *Squatina guggenheim* (Chondrichthyes: Squatiniformes) off the coast of Argentina. Folia Parasitologica 56(4): 284–294. https://doi.org/10.14411/fp.2009.033

Menoret A, Ivanov VA (2012a) A new species of *Heteronybelinia* (Cestoda: Trypanorhyncha) from *Sympterygia bonapartii* (Rajidae), *Nemadactylus bergi* (Cheilodactylidae) and *Raneya brasiliensis* (Ophidiidae) in the south-western Atlantic, with comments on host specificity of the genus. Journal of Helminthology 87(4): 467–482. https://doi.org/10.1017/S0022149X12000545

Menoret A, Ivanov VA (2012b) Description of plerocerci and adults of a new species of *Grillotia* (Cestoda: Trypanorhyncha) in teleosts and elasmobranchs from the Patagonian shelf off Argentina. The Journal of Parasitology 98(6): 1185–1199. https://doi.org/10.1645/GE-3107.1

Menoret A, Ivanov VA (2014) Eutetrarhynchid trypanorhynchs (Cestoda) from elasmobranchs off Argentina, including the description of *Dollfusiella taminii* sp. n. and *Parachristianella damiani* sp. n., and amended description of *Dollfusiella vooremi* (São Celemente et Gomes, 1989). Folia Parasitologica 61(5): 411–431. https://doi.org/10.14411/fp.2014.056

Menoret A, Ivanov VA (2015) Trypanorhynch cestodes (Eutetrarhynchidae) from batoids along the coast of Argentina, including the description of new species in *Dollfusiella* Campbell et Beveridge, 1994 and *Mecistobothrium* Heinz et Dailey, 1974. Folia Parasitologica 62: 058. https://doi.org/10.14411/fp.2015.058

Menoret A, Ivanov VA (2021) New species of *Guidus* Ivanov, 2006 (Cestoda: Phyllobothriidea) from *Bathyraja magellanica* (Philippi) from the Patagonian Continental Shelf of Argentina. Folia Parasitologica 68: 011. https://doi.org/10.14411/fp.2021.011

Menoret A, Mutti L, Ivanov VA (2017) New species of *Aberrapex* Jensen, 2001 (Cestoda: Lecanicephalidea) from eagle rays of the genus *Myliobatis* Cuvier (Myliobatiformes: Myliobatidae) from off Argentina. Folia Parasitologica 64: 009. https://doi.org/10.14411/fp.2017.009

Muñoz G, Cartes FD (2020) Endoparasitic diversity from the Southern Ocean: Is it really low in Antarctic fish? Journal of Helminthology 94: e180. https://doi.org/10.1017/S0022149X20000590

Mutti LD, Ivanov VA (2016) A new species of *Paraberrapex* Jensen, 2001 (Cestoda: Lecanicephalidea) from *Squatina guggenheim* Marini (Squatiniformes: Squatinidae) off Argentina. Folia Parasitologica 63: 007. https://doi.org/10.14411/fp.2016.007

Mutti LD, Franzese S, Ivanov VA, Arredondo NJ (2023) Ultrastructure and histochemistry of the scolex of two Neotropical proteocephalidean species (Cestoda: Onchoproteocephalidea). Journal of Morphology 284(5): e21580. https://doi.org/10.1002/jmor.21580

Naylor GJP, Caira JN, Jensen K, Rosana KAM, Straube N, Lakner C (2012) Elasmobranch phylogeny: A mitochondrial estimate based on 595 species. In: Carrier JC, Musick JA,Heithaus MR (Eds) The Biology of Sharks and Their Relatives (2nd ed.). CRC Press, Boca Raton, 31–56. https://doi.org/10.1201/b11867-4

Oosthuizen G, Acosta AA, Smit NJ, Schaeffner BC (2021) A new species of *Grillotia* Guiart, 1927 (Cestoda: Trypanorhyncha) from the spotted skate, *Raja straeleni* Poll, in South Africa. Parasitology International 82: e102307. https://doi.org/10.1016/j.parint.2021.102307

Ostrowski de Nuñez M (1971) Estudios preliminares sobre la fauna parasitaria de algunos elasmobranquios del litoral bonaerense, Mar del Plata, Argentina. I. Cestodes y trematodes de *Psammobatis microps* (Günther) y *Zapteryx brevirostris* (Müller y Henle). Physis 30(81): 425–446.

Ostrowski de Núñez M (1973) Estudios preliminares sobre la fauna de parasitaria de algunos elasmobranquios del litoral bonaerense, Mar del Plata, Argentina. Physis 32: 1–14.

Palm HW, Palm N, Haseli M (2019) Tentaculariid trypanorhynchs (Platyhelminthes: Cestoda) from *Mobula japanica* (Müller & Henle) from Indonesia, with the description of two new species. Parasitology Research 118(12): 3307–3313. https://doi.org/10.1007/s00436-019-06497-2

Pickering M, Caira JN (2012) A new hyperapolytic species, *Trilocularia eberti* sp. n. (Cestoda: Tetraphyllidea), from *Squalus* cf. *mitsukurii* (Squaliformes: Squalidae) off South Africa with comments on its development and fecundity. Folia Parasitologica 59(2): 107–114. https://doi.org/10.14411/fp.2012.016

Randhawa HS, Poulin R (2019) Tapeworm discovery in elasmobranch fishes: Quantifying patterns and identifying their correlates. Marine and Freshwater Research 71(1): 78–88. https://doi.org/10.1071/MF18418

Reyda FB, Marques FPL (2011) Diversification and species boundaries of *Rhinebothrium* (Cestoda; Rhinebothriidea) in South American freshwater stingrays (Batoidea; Potamotrygonidae). PLoS ONE 6(8): 1–26. https://doi.org/10.1371/journal.pone.0022604

Rocka A (2003) Cestodes of the Antarctic fishes. Polish Polar Research 24: 3–4.

Rocka A (2017) Cestodes and nematodes of Antarctic fishes and birds. In: Klimpel S, Kuhn T, Mehlhorn H (Eds) Biodiversity and Evolution of Parasitic Life in the Southern Ocean. Springer International, Basel, 77–107. https://doi.org/10.1007/978-3-319-46343-8_6

Rocka A, Zdzitowiecki K (1998) Cestodes in fishes of the Weddell Sea. Acta Parasitologica 2(43).

Ruhnke TR (2011) Tapeworms of elasmobranchs (Part III). A monograph on the Phyllobothriidae (Platyhelminthes, Cestoda). Bulletin of the University of Nebraska State Museum 25(i–xii), Nebraska, 205 pp.

São Clemente SC, Gomes DC (1989) Trypanorhyncha from sharks of southern Brazilian coast: *Eutetranychus vooremi* sp. n. and two other species parasites of *Mustelus* (Pisces, Triakidae). Memorias do Instituto Oswaldo Cruz 84(4, suppl 4): 475–481. https://doi.org/10.1590/S0074-02761989000800083

Schmidt GD, Beveridge I (1990) *Cathetocephalus australis* n. sp. (Cestoidea: Cathetocephalidae) from Australia, with a proposal for Cathetocephalidea n. ord. The Journal of Parasitology 76(3): 337–339. https://doi.org/10.2307/3282661

Scholz T, Oros M, Bazsalovicsová E, Brabec J, Waeschenbach A, Xi B-W, Aydogdu A, Besprozvannykh V, Shimazu T, Králová-Hromadová I, Littlewood DTJ (2014) Molecular evidence of cryptic diversity in *Paracaryophyllaeus* (Cestoda: Caryophyllidea), parasites of loaches (Cobitidae) in Eurasia, including description of *P. vladkae* n. sp. Parasitology International 63(6): 841–850. https://doi.org/10.1016/j.parint.2014.07.015

Stehmann MF, Weigmann S, Naylor GJ (2021) First complete description of the dark-mouth skate *Raja arctowskii* Dollo, 1904 from Antarctic waters, assigned to the genus *Bathyraja* (Elasmobranchii, Rajiformes, Arhynchobatidae). Marine Biodiversity 51(1): 1–27. https://doi.org/10.1007/s12526-020-01124-1

Suriano DM (2002) *Anthobothrium galeorhini* n. sp. (Eucestoda: Tetraphyllidea) a parasite of *Galeorhinus galeus* (Triakidae) from the Argentine coast. Parasite (Paris, France) 9(2): 121–125. https://doi.org/10.1051/parasite/2002092121

Suriano DM, Labriola JB (2001a) Redescription of *Cathetocephalus australis* Schmidt et Beveridge, 1990 [Cestoda, Cathetocephalidae] parasite of *Carcharhinus brachyurus* [Gunther] [Pisces, Carcharhiniformes] from the Southwestern Atlantic Ocean. Acta Parasitologica 46(4): 276–279.

Suriano DM, Labriola JB (2001b) A new *Orygmatobothrium* Diesing, 1863 (Eucestoda: Tetraphyllidea) parasite of *Mustelus schmitti* Springer, 1939 (Carcharhiniformes, Triakidae) from the southwestern Atlantic Ocean. Zoosystema 23: 669–673.

Tanzola RD, Guagliardo SE, Brizzola SM, Arias MV, Botte SE (1998) Parasite assemblage of *Sympterygia bonapartii* (Pisces: Rajidae), an endemic skate of the southwest Atlantic. Helminthologia 35(3): 123–129.

Tyler GA II (2006) A Monograph on the Diphyllidea (Platyhelminthes, Cestoda). Bulletin of the University of Nebraska State Museum 25(i–xii), Nebraska, 142 pp.

Van Der Spuy L, Smit NJ, Schaeffner BC (2022) Threatened, host-specific affiliates of a red-listed host: Three new species of *Acanthobothrium* van Beneden, 1849 (Cestoda: Onchoproteocephalidea) from the endangered white skate, *Rostroraja alba* (Lacépède). International Journal for Parasitology. Parasites and Wildlife 17: 114–126. https://doi.org/10.1016/j.ijppaw.2021.12.010

Weigmann S (2016) Annotated checklist of the living sharks, batoids and chimaeras (Chondrichthyes) of the world, with a focus on biogeographical diversity. Journal of Fish Biology 88(3): 837–1037. https://doi.org/10.1111/jfb.12874

Wojciechowska A (1990a) *Onchobothrium antarcticum* sp. n. (Tetraphyllidea) from *Bathyraja eatonii* (Günther, 1876) and a plerocercoid from Notothenioidea (South Shetlands, Antarctic). Acta Parasitologica Polonica 35(2): 113–117.

Wojciechowska A (1990b) *Pseudanthobothrium shetlandicum* sp. n. and *P. notogeorgianum* sp. n. (Tetraphyllidea) from rays in the regions of the South Shetlands and South Georgia (Antarctic). Acta Parasitologica Polonica 35(3): 181–186.

Wojciechowska A (1991a) Some tetraphyllidean and diphyllidean costodes from Antarctic batoid fishes. Acta Parasitologica Polonica 36(2): 69–74.

Wojciechowska A (1991b) New species of the genus *Phyllobothrium* (Cestoda, Tetraphyllidea) from Antarctic batoid fishes. Acta Parasitologica Polonica 36(2): 63–68.